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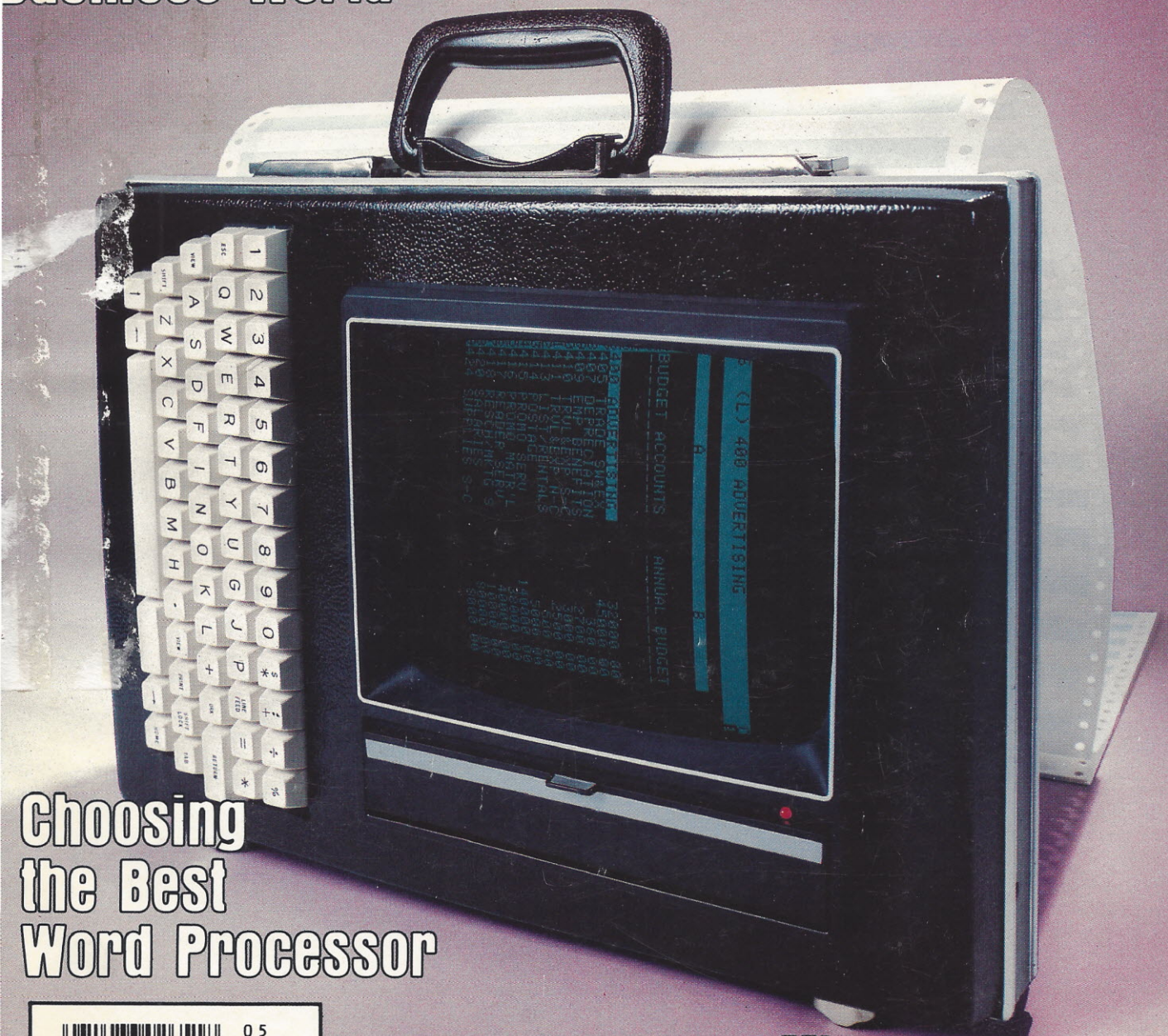

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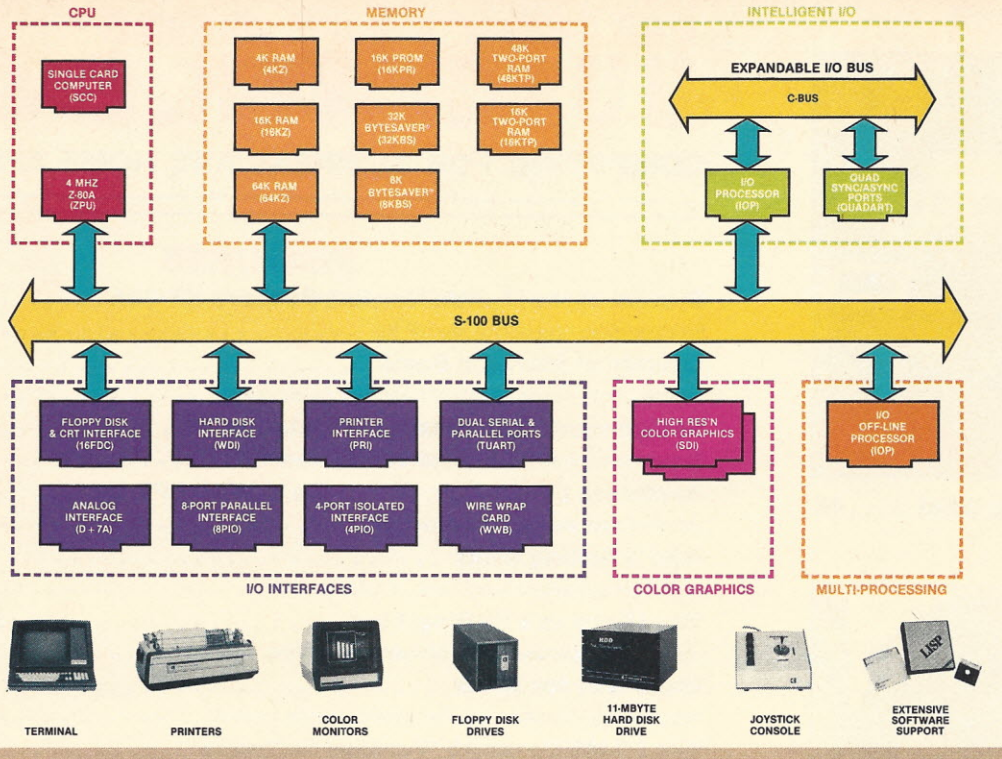

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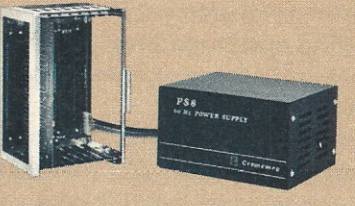

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SINCE DECEMBER 1975

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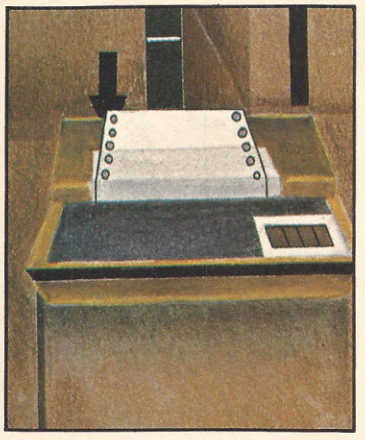

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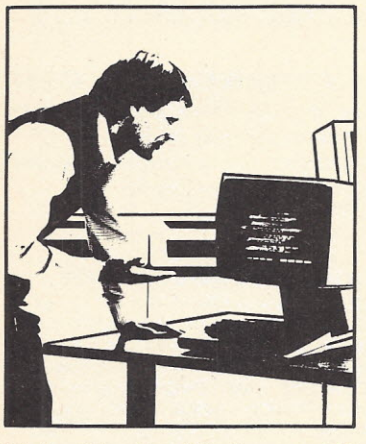

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FEATURES

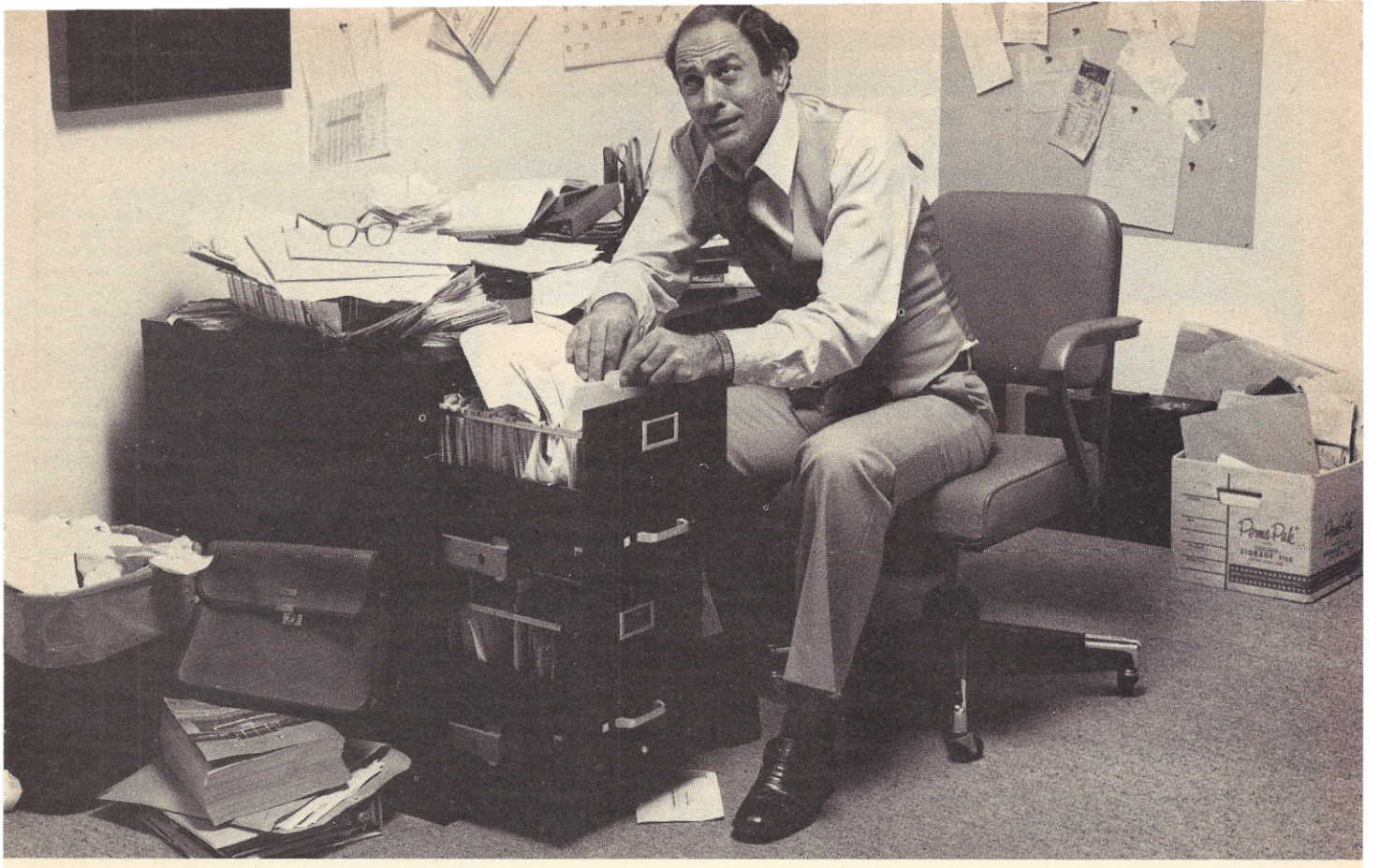
COLUMNS

DEPARTMENTS

Contact authors of monthly columns by writing to them at INTERFACE AGE, P.O. Box 1234, Cerritos, CA 90701 in care of their respective columns.

INTERFACE AGE Magazine, published monthly by McPheters, Wolfe & Jones, 16704 Marquardt Ave., Cerritos, CA 90701. Subscription rates: U.S. $18.00, Canada/Mexico $20.00, all other countries $35.00. Make checks payable in U.S. funds drawn on a U.S. bank. Opinions expressed in by-lined articles do not necessarily reflect the opinion of this magazine or the publisher. Mention of products by trade name in editorial material or advertisements contained herein in no way constitutes endorsement of the product or products by this magazine or the publisher. Circulation Department, (213) 926-9540.

INTERFACE AGE Magazine is catalogued in the Library of Congress, Classification No. QA75.5.155. USPS No. 580-310. ISSN Publication No. 0147-2992.
POSTMASTER: Please send change of address form 3579 and undelivered copies to **INTERFACE AGE** Magazine, 16704 Marquardt Ave., Cerritos, CA 90701. Controlled circulation postage paid at Lincoln, Nebraska and Artesia, California.



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International/Domestic Retail Circulation

(213) 926-9544 **Mary Ann Lower**

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EDITOR'S NOTEBOOK

Tips for improving programming style

What are the elements of a good computer program? First of all, it should *work*. That is, it should instruct a computer to perform its intended function. This fundamental requirement leads immediately to a second criterion: that the program be readable, in some form, by the computer itself.

But is that all there is to it? Taking as evidence the many programs that are submitted to us for publication every week, a lot of programmers think so. There is apparently a widespread feeling that if a program entices the machine to do something clever and new—and it runs properly while doing so—it is worthy of publication to the computing community. We don't agree.

A good program should be readable not only by computers, but by *people* as well. Not only readable, but easily comprehensible by one who is trained in the vocabulary and syntax of the language being used. (Of course, we are talking about the source listing of the program, not the compiled or assembled object code that is generated in some instances.)

We are particularly sensitive to this need, since every program we publish is meant primarily for human eyes. Before a computer has a chance at one of our programs, it must travel the path from printed page via a reader's eyes to fingers on a keyboard.

But reasons for good programming style go far deeper than this. Even if you will be the only person to ever look at the fruits of your software labor, there are excellent reasons to make every program you write one that is suitable for publication. Maintainability is most important. If you write a program so that a stranger can understand it, your chances of fixing or improving it sometime in the future is greatly enhanced. Another consideration is that the effort taken to make a program picture pretty can lead to a better organized, more workable product.

Consider comments, or remarks. Almost every language has a means to enter non-executable statements into the source code. Comments can be used to self-document a program; that is, insert written material into the body of the program itself. Use comments generously. Here's the secret: Don't write the program, debug it, *then* go back and insert the comments. Make your notations as you go along, explaining what is happening each step of the way.

Some would call this a waste of time, stating that a computer program is a dynamic entity during development; that most statements will be transformed or replaced as the debugging process goes on. If that's the case with your programs, you're doing something very wrong. You're probably attacking the problem without a very good plan, and not truly understanding what each program statement is doing in the overall scheme. The effort of inserting comments in real time, as the program emerges from your head, can go a long way towards organizing your thought processes. If you can't put in words what a certain step is doing in the program, perhaps it doesn't belong there. Try this simple trick, and see if the development cycle doesn't go a lot more smoothly. As a bonus, the result is sure to be more human-readable.

While on the subject of comments, we would encourage programmers in high-level languages (Basic, Pascal, etc.) to inspect some good examples of assembly language programs. Notice that many of them include a remark for *every line* of the program. Even if you don't understand a single word of the particular language being used, it's possible to understand the program flow by just scanning the comment fields at the right of the listing. It's not a bad goal for all programs, regardless of the language: comment each and every line.

What makes a program difficult to read? In the case of Basic, there are two main culprits: leaving out spaces between words and over-use of multiple statement lines. Both of these tricks are meant to save computer memory, but each has an amazing capacity for making a program all but incomprehensible. What does this Basic statement(s) do?

```
100FORT=O1TOO2:IFA$(T)>N$THE
NN$=A$(T):NEXTT:RETURN
```

Sure, it can be deciphered, just as a telegram can be puzzled out—with head-wracking effort. Remember telegrams? At one point in communications history, limitations of the technology would produce messages like:

WANT TO COME HOME BUT CANT STOP TELL PA TOO STOP ROMANCE PROSPECTS GOOD STOP

(STOP, of course, served the purpose of a non-existent "." character on early telegraph equipment.) Just as telegrams have given way to less abrasive conveyances of sentiment, computers—even low-cost micros—have reached the point where it is no longer necessary to compromise in the area of program readability.

Most of the tricks that save computer memory are guaranteed to make a program harder to read. The use of these tricks, we have noted, has become more of a bad habit than necessary tool. RAM space and the need for pretty programs are only in competition at the outer limits of available memory space—a condition reached far less frequently than you would suppose. We have a good use for all of that excess RAM: fill it with comments and good, readable program structure.

Suppose you have developed a useful program that is, in addition, a beauty to the eyes. Wouldn't you like to see it in the pages of *Interface Age?* If this appeals to you, write an article explaining what need the program fills, and perhaps what motivated you to write it. Explain how it is used, giving real-life examples. Explain how the program works and what principles are utilized within it. (This step can be a lot easier if the program itself is clearly arranged and self-documented.) By all means, include a sample run or two of the program's operation.

If not evident in the program itself, include a list of the variables and their usages. Describe your system in some detail—its operating system, language type and version, the peripherals needed. If you are aware of any special capabilities of the particular language you are using, describe how the same results can be obtained in other versions of that language.

The mechanical requirements for publication, although simple, are important. The article itself should be typewritten and double-spaced. It's no problem if you use your word processor and dot-matrix printer (the bulk of our submitted manuscripts come from a computer), but leave the right-margin justify switch off. Include any photographs or illustrations you think are necessary.

We don't re-typeset the program itself, so send us the cleanest listing possible. Make sure your printer doesn't wrap any of the statements around onto the next line. The listing should measure no more than six inches wide. Use unlined paper and a *new* printer ribbon. If your printer is one of the new designs that feature an enhanced and/or double-strike mode, use the combination that provides the sharpest, cleanest copy.

We reject a number of programs largely for the reasons described here. It is our goal to publish only good examples of programming style, so that learning programmers can confidently pattern their work after what they see.

—TF

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LETTERS

Making waves

I enjoyed your column on fiber optics ("Inventor's Sketchpad" IA Jan 81). Just the week before I was reading about microwave behavior in a waveguide. It was interesting to see the whole subject moved to higher frequencies and a different medium. Perhaps the engineering problems will not be too different.

Cam Trevor
Seattle, WA

Switch to bar code

I would like to call attention to the fact that, recently, bar code readers have been made commercially available for the personal computer market.

I would suggest that you consider the writing of articles discussing the application and availability of bar code readers and bar code generators and listings written in bar code. I would also like to see future listings in your magazine in bar code format. Just about anything is easier to read than poorly printed dot matrix listings.

William N. Coxe, Jr.
Baton Rouge, LA

Furniture addition

Regarding your article on computer furniture (IA Jan 81), you missed a very good company. I am using modular furniture I purchased from WP/AS Concepts, Fairfield, OH.

I was able to design my own setup by selecting various modules from a wide selection. The furniture is built like a battleship: 1-in particle board covered with a wood-grained plastic veneer that must be 1/16 of an inch thick; bolts to hold the modules together that must be 3/8 inch in diameter, etc.

I have been using this furniture for over two years. It has been moved two or three times (disassembled and reassembled) and shows no signs of wear at all. I recommend this furniture to anyone looking for a high quality product.

Leland C. Sheppard
Sunnyvale, CA

Video education

In a recent column, ("Learning with Micros" IA Feb 81), you point to a lack of educational software. I suspect the problem is very much like the one discussed in that same issue on pages 12 and 14 regarding interactive programming and video discs. We simply haven't yet learned how programs can provide distinctive forms of teaching experience. The educational software available often follows conventional formats of question/answer/feedback with perhaps selective followup to reflect the quality of responses and adapt to the individual. I'm intrigued by the possibilities of computers as a base for radically different modes of learning.

Edward Brent
Columbia, MO

More than meets the eye

I was very happy to see you evaluate the IBM 5120 (IA Jan 81), my nominee for leader in its field. My general impression of your article is good, but you can't evaluate a computer from a three hour seminar and a question/answer period after. You can't evaluate a car without driving it. Put a 5120 on your desk for a few weeks, and you will understand. You can't measure the productivity of a computer (especially a micro) in CPU MHz or average disk access time. Too many other things must be considered, such as ease of operation and ease of programming.

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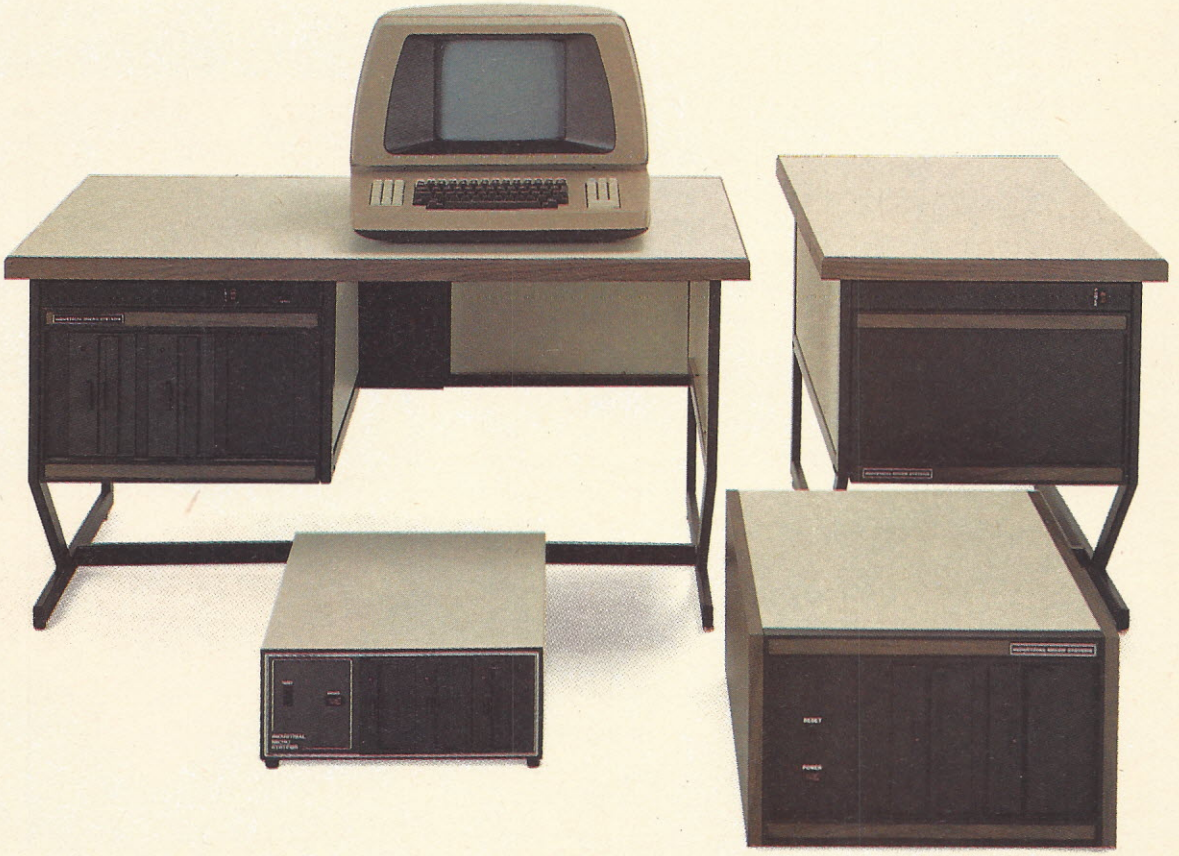


The 5120 is superbly designed and engineered, with software available that works. It's a company that will be around to help you next year or seven years from now, and with probably the best resale value of any vendor on the market.

A.D. Phelps
Hood River, OR

Single file

After reading the review of Condor Series 20 DBMS (IA Feb 81), I arranged an in-person demo with the principal author of the software, Bob Cohen.

I have little difficulty supporting much of what Carl Heintz wrote. However, there are items of importance which he did not cover:

1. Files are sequential. Recall of a particular record is not random. This will reduce speed under this condition.
2. Print facility provided by the software is sparse. For many reports, files will have to be converted to a different format, then accessed by the software used to print the report.
3. Therefore, cost of $700 is essentially for database input software — too high.

Ben Torres
Redlands, CA

Sequential files are not slower than random. It depends entirely upon the application. In many applications, a sequential file structure can be faster than random file methods due to floppy disk access speeds. DBMS beats most competitors because it allows the user to read Basic files, and it can write its files to Basic format.

Print facilities are abundant if you know where to look. Unfortunately, some of the most powerful print features are locked up in what would appear to be, at first glance, the input cycle. DBMS allows a user to format a blank screen in any fashion desired, with fields from the record in any order desired. The records can be printed out exactly as desired. Steps necessary to convert files and/or sort them can be programmed so as to be completely transparent to the user. Since the programs run in assembler, they will beat any configuration in Basic to accomplish the same of similar tasks.

The price is not too high. One must consider the product received—the ease of installation, the simplicity of application, the power and interface features. These are all part of what one pays for in a data base system. —C.H.

Question of terminology

I was pleasantly surprised to pick up the Feb 81 issue. The cover gave me the impression that the issue was devoted to the subject of microfilm. However, when I looked inside, I discovered that it really had to do with computer graphics.

The National Micrographics Association has been in existence for about thirty years and is the professional and trade association of the microfilm industry. The term micrographics has been associated worldwide with microfilm, and is defined in the official NMA Glossary of Micrographics, TR2-1980, as: "Techniques associated with the production, handling and use of microforms."

William E. Neale
National Micrographics Assoc.
Silver Spring, MD

Saving the day

I really like Alan Miller's idea of using the CP/M SAVE command to date his floppy disks (IA Feb 81). As I use a directory program that gives essentially the same information as STAT, but in a more esthetic manner, I've slightly modified Miller's idea. To date a file, I type: SAVE 0 (020581) because the parentheses look nicer than a comma. Further, I title my disks in much the same way. For example, to entitle a disk Basic number 3, I type: SAVE 0 -BASIC.003.

The (appears before the -, which appears before any letter in the ASCII collating sequence, so my directory program outputs the date followed by the title. Readers who use the TPM operating system will find that the form I've suggested for the date will create a SYS file. To avoid that, type: SAVE 0 (020581). The filetype characters will be spaces (ASCII 20H).

Prof. Peter J. Holsberg
Mercer County Community College
Trenton, NJ

Bit by bit

The pendulum is swinging too far! Small business is looking forward to the wide availability of 16-bit micro based systems. When peripheral costs are identical and programming the 16-bit units is simpler, it makes sense that 16-bit micros will ultimately be cheaper. It is disturbing, however, to see manufacturers like Motorola and Zilog rushing to announce bus configurations that are overshooting the needs of 99% of all small companies.

Hopefully there are quite a few companies that will take chips like the 68000 and the Z8000 and combine them with the Multibus to make a system that will be good for today and even the next ten years. After that, who knows?

Henry Keultjes
Mansfield, OH

Still more recovery

Re: "Additional recovery" (Letters, IA Mar 81), the procedure in ROM solves only part of the problem. Although the program is recovered for purposes of listing, other operations will cause the machine to hang-up. Also, the proposed method will not work at all with disk based systems.

Jerry Kovacic
New York, NY

Music to his ears

Re: Learning with Micros (IA Feb 81), perhaps I can contribute some information regarding CAI. Many of Lou Frenzel's propositions are undoubtedly correct and I agree with those who bemoan the poor quality of educational software.

The problem, however, that some of us face is that while we have the writing and teaching skills (and are learning the programming skills), we cannot afford to buy the requisite computer equipment to begin developing programs. And the schools these days are in very poor financial condition.

I have been working for the past eight months on programs in music education, and attempting to find funding to purchase the equipment I need. I've applied to the Apple Education Foundation for a grant, but that's a highly competitive situation. Meanwhile, I'm working on the structure and development of programs in music theory. I intend to explore music history and music appreciation.

I'm ready to go, but I'm stalled with the familiar lack-of-funds syndrome. Hopefully the AEF will solve that problem and I'll be on my way with the computer solution to one facet of education that has been largely ignored in the computer revolution.

Robert L. Riggs
Channel Islands High School
Oxnard, CA

Reader interface

I am writing to inquire about suppliers of microcomputers and related equipment. I am planning an operation in my business where I wish to monitor and control, by computer, various types of machinery. I have so far had difficulty in finding suppliers that can furnish that type of industrial oriented computer equipment that can receive inputs directly from sensing devices and in turn directly operate machine circuits. I would appreciate any assistance.

Bruce E. DuMond
65 North St.
Walton, NY 13856

Would it be feasible to run the Super Dazzler interface in my North Star Horizon (S-100) computer? North Star tells me that some memory cycling times would have to be fixed; Cromemco doubts it would work. If it were possible to install the hardware properly, would one have to write all of one's own graphics routines, or would it be possible to run Cromemco's software, in some way, on the North Star?

John Silver
200 Cabrini Blvd., Apt. 74
New York, NY 10033

I am a quadriplegic and own a TRS-80 level II machine. I am very interested in the possibilities of using it by remote control to operate environmental devices such as lights, TV, alarm, etc. by a voice recognition unit—as when I am in bed I am virtually totally paralyzed.

Can anyone supply ideas or literature on this subject?

Kevin Allen
33 Esdale St.
Blackburn North
3130 Melbourne
Victoria, Australia

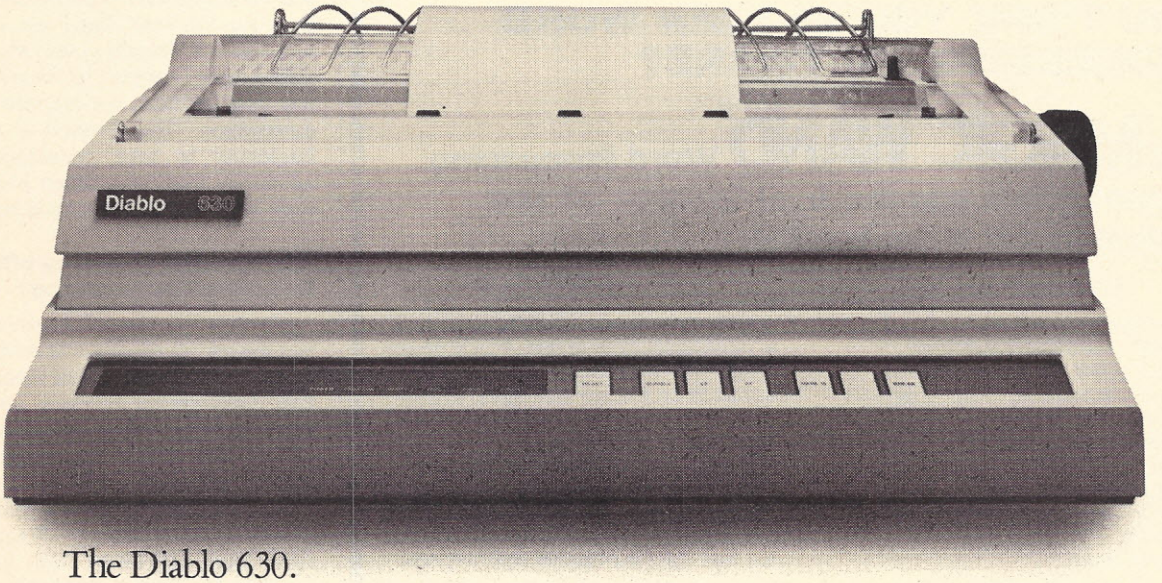
I am interested in any information regarding classroom and school office use of Apple II. We are a nursery through twelfth grade American school located in Karachi, Pakistan, with an enrollment that averages 350. We presently have two systems composed of a 48K Apple II with a language card for Applesoft and Integer Basic. We also have one Centronics 779 printer with a parallel printer interface card and one 3.2 DOS which we plan to update to a 3.3 system.

Patricia Tankersley
Computer Science Teacher
Karachi
Dept. of State,
Washington D.C. 20520

Correction: Standard & Poor's Stockpak program is distributed by Radio Shack for TRS-80 models I and III, not for the model II, as reported in last month's Business Software Review.

Additional note: As we go to press, it has been announced that the Write-on II word processor (reviewed in this issue's article "Word Processing Apple-ications") has been released in a version for the Apple III.

If you want a choice in print wheels, there's only one choice in printers.



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It's the only printer that lets you use either metal or plastic print wheels. So you can choose the print wheel that's just right for the job.

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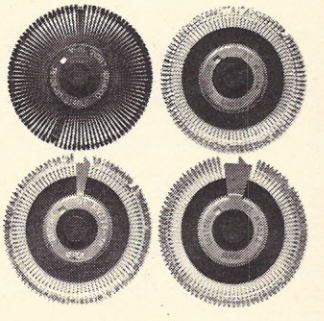

The 630 is the only printer in the world that uses both metal and plastic wheels.

So if you want to change your print wheels, you'll just have to change your printer.

To a Diablo 630 printer.

Diablo Systems

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Computer literacy kit made available for schools

A computer literacy program—Apple Seed—has been introduced by Apple, Inc. to provide qualifying elementary and high schools with computer course materials. More than 700 Apple dealers in the U.S. and Canada will participate in the program.

Under the program, Apple Computer will provide a bonus kit of course materials, valued at approximately $500, to each school that qualifies as a "start-up" school and which buys an Apple computer with disk drive. The offer runs through July 31, 1981. School districts expanding ongoing computer education programs with additional computers can also qualify to receive the free material. The offer is limited to one set of Apple Seed materials per school.

The Apple Seed kit is aimed at serving teachers as well as students. It contains a computer literacy program for teachers and a literacy course for students, including tutorial materials in Basic for classes with up to 25 students.

The principal producers of materials for the courses are Sciences.Research Associates, a division of IBM Corporation; Sterling Swift Publishing Company; and Apple Computer Inc.

French computer market on the upswing

The 1984/85 market for French word and data processing installations will grow to a total of $1.23 billion, while the country plays catchup in the usage of DP and WP equipment. A report by Strategic Business Services, San Jose, CA, points out that the French government is providing heavy support to the evolution of the country into the modern world of automation. The French economy is beginning to take advantage of the advances that have taken place worldwide after years of resisting automation.

Microprocessor adding efficiency to automobile technology

It's only the size of a man's tie tack, but the microprocessor is having a giant impact on the automotive industry. John Call, Engineering Manager for Chrysler Corp., said his company expects to use almost one million microprocessors in its products during 1981.

Call and his engineering staff feel the microprocessor will continue to take over more functions both inside and outside the car during the next few years. He cites some possibilities:

The tiny computer will someday be used to sense the wear and tear and other powertrain changes that could affect fuel economy and emissions, and will automatically adapt the engine to compensate for the changes.

Microprocessors will control automatic transmission shifting for smoother acceleration without any fuel economy penalty.

Also more diagnostic information will appear on future instrument panels, including messages that will warn the driver of pending maintenance problems before they occur.

"Instead of the present-day seat belt warning buzzer system, future instrument panels may include a microprocessor-controlled talking instrument that asks the driver and passengers to buckle up," Call added.

No cost reduction for teleprinters foreseen in near future.

There is no hope that teleprinters will break the $1,500 price barrier in 1981. Only 9% of all teleprinter models marketed today cost less than $1,500,

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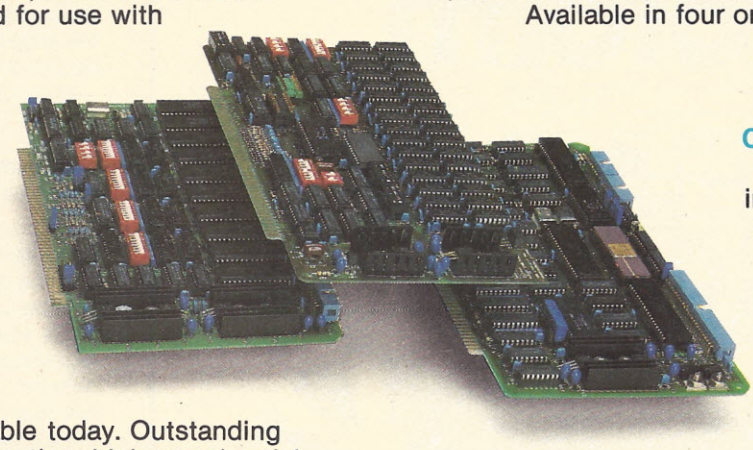

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and there are no significant trends that indicate a breakthrough this year, according to GML Information Services, Lexington, MA.

A recent report reveals that 60% of the teleprinters are priced between $1,500 and $4,000. Most devices priced above $6,000 are multiterminal cluster systems.

According to the report, teleprinter prices have dropped only a modest 20% since 1970 and have somehow managed a stability not indigenous to most computer product markets.

A major indication for the status quo is that prices have declined at a slower rate in recent years. They have been falling at an average rate just above 1% for the last 3 years compared to an average drop of 3% during the last decade. Further support for this prediction is the lack of new technological innovations on the present horizon that could contribute to cost reductions.

Japanese telecom market opportunities forecast

Final Japanese concessions on telecommunications equipment procurement issues will lead to significant market opportunities for American and other foreign vendors, according to a report by Northern Business Intelligence, New York, NY.

The best opportunities for foreign suppliers will be in PBXs and data com equipment in the short term, and in digital central office switching systems and fiber optics over the medium to long term, according to NBI.

The potential is huge. Sources estimate the current central office switching market at $605 million; the transmission market (including carrier and microwave) at $553 million; the subscriber equipment market (including PBX) at $333 million; the data com market (including fax) at $443 million; and outside plant and power equipment at more than a billion dollars. The talks have also opened up the interconnect market (including fax and data terminals) which now tops $600 million.

Three viable means for entering the market are available to suppliers: enter a joint venture with a small but aggressive Japanese company; sell through one of the large trading firms; or—the most difficult but potentially lucrative possibility—start up a manufacturing operation.

Computer model determines distance between satellites in orbit

A computer based model of a tandem two-satellite configuration in low altitude has helped to confirm the feasibility of a proposed satellite system for global small scale gravity measurement. The experiment proved that the distance between the satellites measured by a two-way radio signal at 100 GHz through the atmosphere would be accurate to a nominal two tenths of a millimeter.

Such a system has been proposed by the National Aeronautics and Space Administration and is under study by the John Hopkins U. Physics Lab, Howard County, MD.

In addition to providing more accurate gravity models, such a mission can be used to improve our knowledge of geometrical features on the Earth's surface, properties of the Earth's crustal plates and circulation of the oceans and major current systems.

Survey confirms growing dependence of hospitals on computers

The National Report on Computers and Health has announced results of a nationwide reader survey showing

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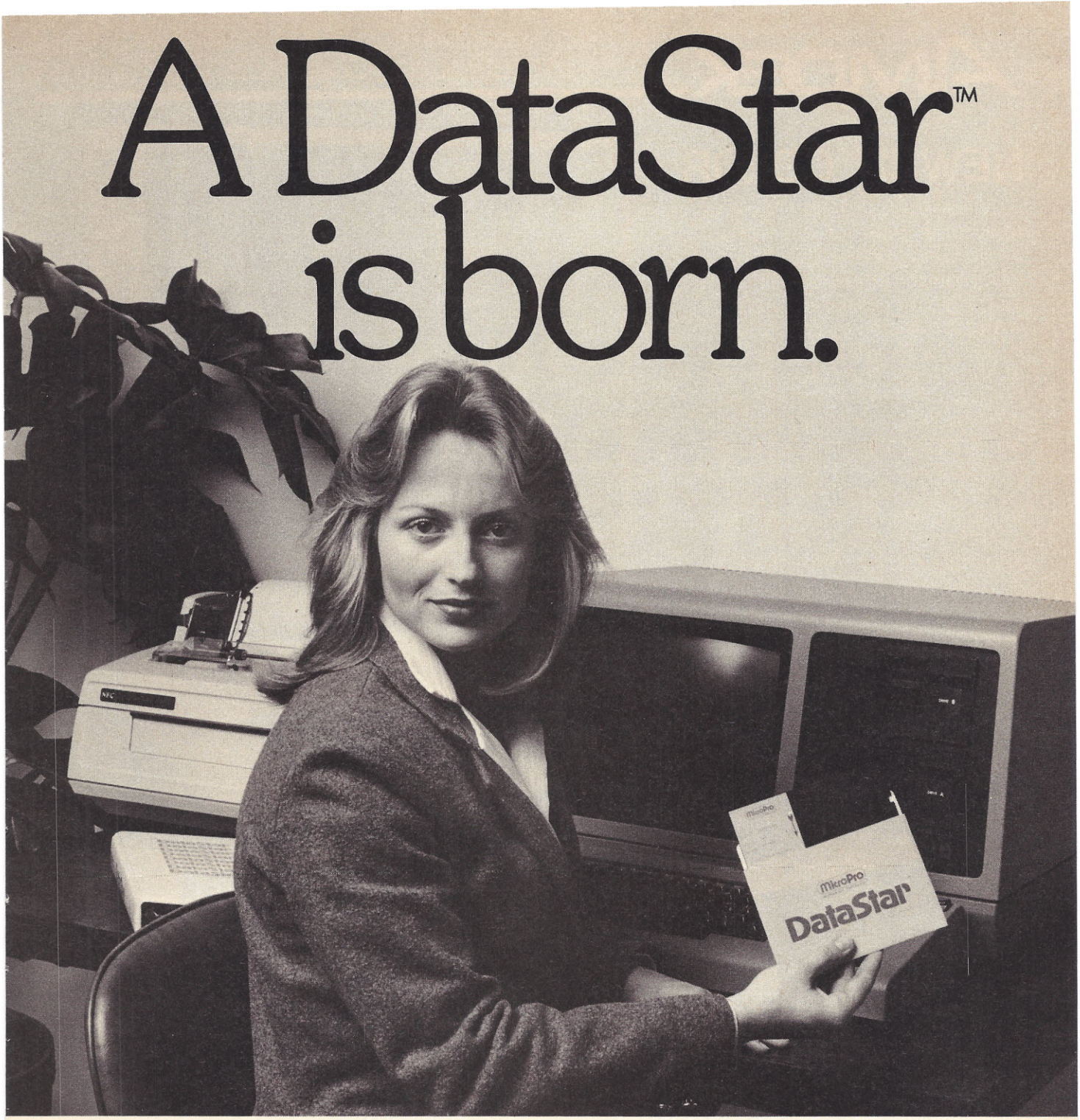

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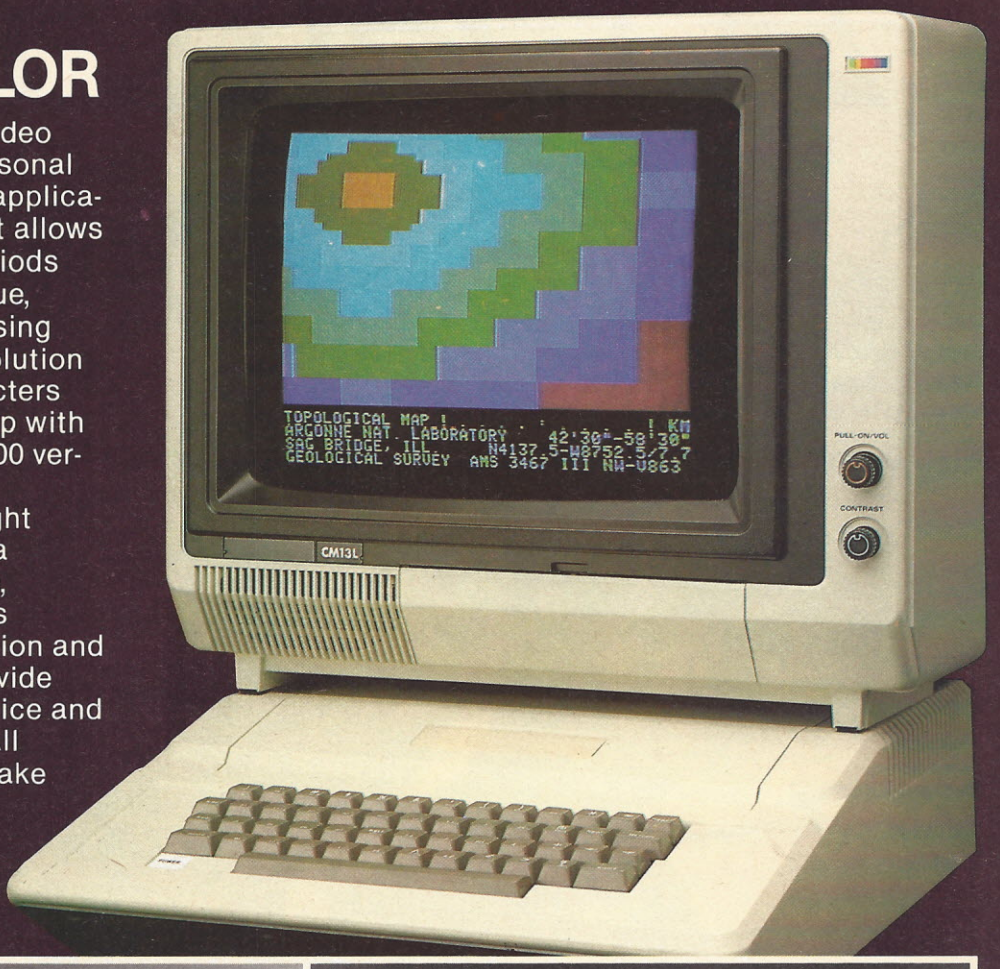
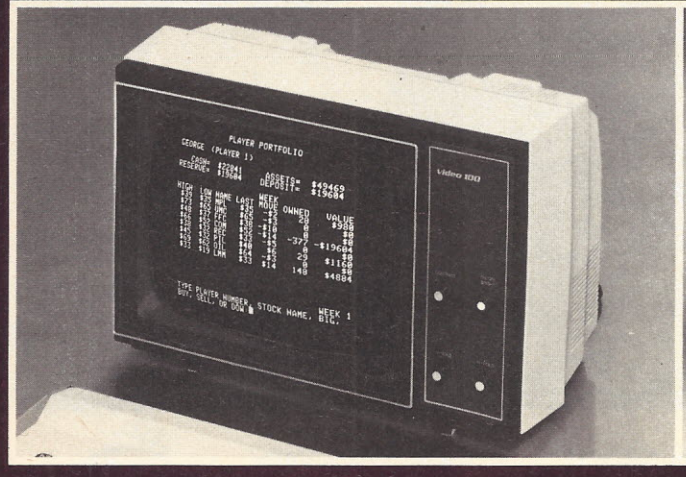
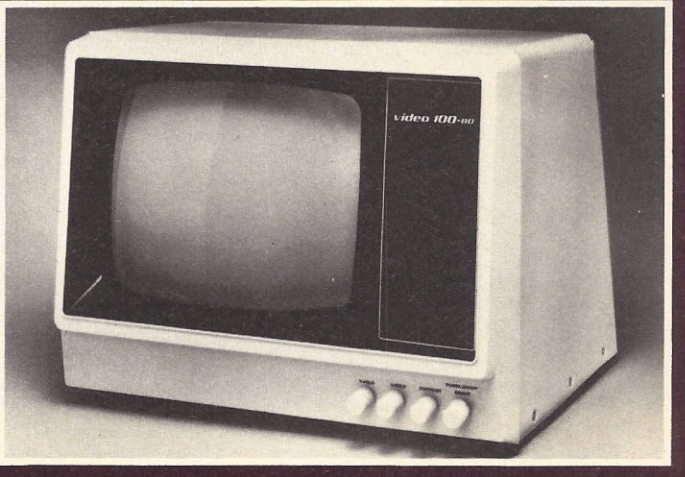
This compact, lightweight monitor (only 25 lbs.) has a molded-in carrying handle, making it easy to move. Its industrial grade construction and shatter resistant case provide reliable service in both office and industrial environments. All front mounted controls make it easily adjustable at a glance without the loss of a single keystroke.







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enthusiastic interest in health and hospital computer systems on the part of its readers.

In healthcare, physicians, administrators, trustees, financial officers, department heads and other health professionals are recognizing that information processing can help them cope with hard choices and decisions and improve the management of hospitals and medical practices, according to the report.

The publication began in May 80, aimed at assisting physicians and health professionals learn more about computer systems, and giving health people a forum in which to share their data processing experiences. It is published 25 times a year, and is the only biweekly professional report aimed at bridging the gap between the healthcare industry and the information processing industries.

Publisher Don Pugliese announced the results of the reader survey conducted in November, 1980; it showed an enthusiastic response and interest on the part of the publication's readers. Additional information is available from P.O. Box 40838, Washington, D.C. 20016, (202) 298-8160.

Clock/calendar feature dropped from Apple III

Apple Computer Inc. has discontinued the built-in clock/calendar circuit as part of its Apple III personal computer. As a result, the price has been reduced by $50.

The battery operated integrated circuit is not critical to the system's operation, according to spokesmen. It is used to log time and date information automatically on files the computer has stored. Users, typically those keeping accounting records, can enter this information manually from the computer keyboard.

"We are removing the clock chip because we have not been able to obtain a supplier that can meet our rigid quality and reliability standards," said Barry N. Yarkoni, product marketing manager. "We feel that elimination of this circuit will have a positive effect on Apple III manufacturing schedules."

Customers who currently have an Apple III will receive a $50 rebate from the company. Letters announcing the change and offering the rebate have been mailed to all Apple III owners who have returned a warranty card. Dealers have also been notified.

Fellowship offered by institute for computer history dissertation

The Charles Babbage Institute for the History of Information Processing is accepting applications for a Graduate Fellowship to be awarded for the 1981-1982 academic year to a graduate student whose dissertation will be on some aspect of the history of computers and information processing.

The stipend will be $5,000 plus an amount up to $2,500 for tuition and fees. Priority will be given to students who have completed all course work and have completed all requirements for the doctoral degree except the research and writing of the dissertation. However, even incoming graduate students will be considered. The Fellowship may be extended for a period of one to three years if continued support is merited in the eyes of the selection committee.

Appropriate thesis topics might be concerned with aspects of the development of the information processing industry and its infrastructure; with specific technological developments in the information sciences, including both hardware and software, especially if they also deal with the economic and organizational milieu of the developments; or with the economic, legal or social history of computing. There are no restrictions on the location of the academic institution which will be the venue for the Fellowship.

Applications should be sent to Prof. Roger H. Stuewer, Charles Babbage Institute, U. of MN, 104 Walter Library, 117 Pleasant St. S.E., Minneapolis, MN 55455, by April 15, 1981. Applications should include biographical data and a research plan or design. Applicants should arrange for three letters of reference, certified transcripts of college credits and GRE scores (or their equivalents abroad) to be sent directly to Prof. Stuewer.

U.S. enterprise to market British videotex and teletext

In a recent announcement at the British Embassy, Dr. Dill Faulkes, president of Logica Inc., outlined a plan with British Telecom to market British teletext and videotex systems in the United States. The venture, known as BVT (British Videotex and Teletext) will promote the technology and standards of British videotex and teletext services.

Logica is a computing and communications company with offices throughout the world including a U.S. subsidiary in New York. British Telecom, formerly the telecommunications arm of the British Post Office, operates Britain's telephone system.

Dr. Faulkes pointed out that BVT will be marketing a wide range of systems and will provide information on equipment, software and knowhow available for the teletext and videotex industry.

A British industry submission to the FCC on teletext standards for 525 and 625 line transmissions is imminent. Multi-level standards have been defined so that presently conceived and future technology will be encompassed, in addition to the system which is already operating in seven countries with almost 250,000 teletext receivers in use.

On the videotex side, BVT will market in the U.S. both the hardware and the software for Prestel systems to telephone, cable and broadcasting companies, and industrial/commercial organizations which operate their own videotex systems.

Prestel is the videotex system developed by British telecom and now operating as a national service in England. On the teletext side BVT will market a range of television-related systems including: Context teletext systems, which allow the broadcaster to transmit up-to-the-minute news, magazine and advertising information which television viewers can call onto their screens at any time in place of the regular program; Flair, an electronic paintbrush tool for the graphic designer allowing him to create artwork and graphics directly onto the television screen with an artistic finish similar to that produced with conventional materials on canvas; and Icon, an intelligent, interactive graphics system for the on-air creation of high resolution text and diagrams, with a comprehensive range of real-time facilities.

Teletext allows the viewer to use his television as a newspaper, a shopping guide or an educational tool. Videotex turns the set into an interactive business terminal, and a cost-effective electronic publishing facility.

Future risky for some in computer printer market

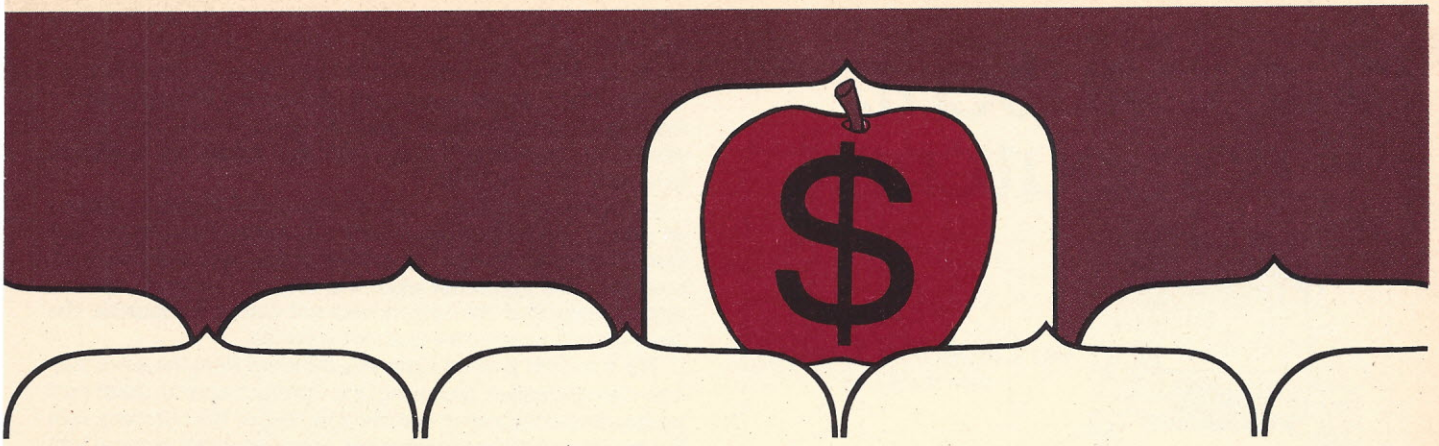
Technological improvements and tough economic conditions will combine to weed out the weaker competitors in the printer market between now and 1985, according to a recent study by American Computer Appraisal Service, Boston, MA. Improvements in electronic means of reproduction will simplify hardware while continued inflation and increasing capital requirements will squeeze out smaller companies, making it possible for only the large corporations to survive.

According to the report, significant increases in research and development expenditures are needed to insure survival in the market. And figures indicate that only those firms that are already financially sound will be able to afford such insurance.

All printer companies face risks between now and 1985, regardless of size. Smaller companies will find the obstacles greater and may find themselves forced to withdraw from the market. Even the larger ones, however, risk losing control of financial management (including R & D expenditures) and experiencing chaos in the corporate structure. This will occur as marketing strategies shift in response to changes in the technological environment; greater pressure will be on to keep up with advancing sophistication in serial matrix printers, and with the development of multiple copy non-impact inkjet and laser printers.

American's conclusion that survival in the market will be expensive is derived through a review of the present competitive postures of companies with significant market shares and their expected stands in the market by 1985.

Copies of the study are available from P.O. Box 68, Kenmore Station, Boston, MA 02215, (617) 437-7100.



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Jurisprudent Computerist

By Elliott MacLennan
Attorney at Law

Problem Areas in Computer Purchases

The sale and purchase of a computer system typically involves hardware, software, peripherals and documentation. Since 10 million microprocessors were reportedly sold by the end of 1980, including 750,000 minis and 250,000 mainframes, ample opportunity exists for a Pandora's Box of economic and legal problems to arise for both vendor and purchaser. It is worth our while to identify frequently encountered legal problems surrounding the purchase transaction from inception to aftermath and to highlight the parry and thrust of vendor and purchaser, as they attempt to reach a favorable resolution.

The essence of the sale and purchase transaction is the contract. A contract creates a web of binding legal ties between vendor and purchaser obligating both parties to various rights and duties, including payment and performance. A contract may be oral (clearly and expressly stated as a "contract"), an informal letter of "agreement", an invoice, or even implied from the facts. All of these are equally enforceable under the law.

The purchaser's shopping for a system and the vendor's sales representative promoting his company's product line presents, for the first time, the potential for dispute. Sales "puffing" (inflated remarks to a prospective purchaser to induce him to purchase the products) is considered fair play by our legal system. Additionally, the representative's opinion as to projected benefits that fail to materialize are also considered fair play.

Representations can be refuted

Representations (as opposed to sales puffing or mere opinions) made by a vendor's representative are defined as statements that are considered directly attributable to the company's product line. Whether made with the active intent to deceive the purchaser or merely constituting an innocent mistake that the purchaser relies upon in making his purchase decision, this situation will generally furnish the purchaser with grounds for legal and financial relief if reported within a reasonable time. An injured purchaser asserts that the injurious statements are representations binding the company. The company defends, claiming that the statements made by the representative were mere opinions or sales puffing.

Should this defense fail, the company will fall back to a stronger legal defense typically found in written contracts called the Parol Evidence Rule (PER). This rule can be spotted by the newcomer where the words "this contract [or agreement] constitutes the entire understanding of the parties..." appear. The effect of the PER is to filter out all the sales and business talk, puffing, opinions and representations in order to limit the purchaser's legal recourse against the vendor to only what is expressed in the contract.

Where a purchaser reasonably believes that the terms of the purchase agreement he signed vary considerably from what was represented to him during the pre-contractual negotiations, he is prevented by the PER from introducing any evidence that would "contradict" the terms of the contract. The purchaser can frequently circumvent the PER by claiming that the contract is either vague or silent on the point about which he complains. Then, he can introduce evidence favorable to his position.

In one reported case, a vendor attempted to defend against an attack by the purchaser that the system he bought was incomplete even though the contract said it was complete in all respects. The purchaser used the silence argument. He was able to show that the system was not complete because the orally promised software was not included.

The fine print is often materially different from the sales talk. The representative approving the contract should exactingly review the configuration and the specifics of the purchase with the purchaser. Such a review can unquestionably reduce substantial problems from arising before the system goes on line.

Two types of warranties are automatically implied by law. They need not be written in any document. The warranty of merchantability requires a vendor to produce goods that are fit for their ordinary intended usage. In one case, a purchaser claimed a defect in the workmanship of a toilet seat that cracked causing injury to the purchaser. In court it was discovered that the purchaser was standing on the toilet seat changing a lightbulb at the time of the breakage. The court had little difficulty in reasoning that the purchaser had not used the seat for its ordinary purpose.

A contract creates a web of binding legal ties between vendor and purchaser obligating both parties to various rights and duties.

The second warranty holds the vendor liable where he has knowledge that the computer system is intended to fulfill a particular purpose, but failed to tailor-make the system for that purpose.

Both warranties apply only to goods. Software, at this time is not considered to be "goods." In a turnkey system, however, courts have extended both warranties, where applicable, to software. The rationale is that a purchaser is not buying a room full of components that have a myriad of different legal classifications; he is buying an expected result from the entire configuration including software.

Both warranties can be limited or disclaimed, except where it would be unconscionable to do so. Limitation and disclaimers are not unfair legal devices cleverly employed by vendors. Instead, they are devices intended to reduce the time-liability-risk of exposure of the vendor. Consider the case where a disparity exists between the vendor's knowledge of his system as compared with the purchase, so that the vendor selects or configures the system while disclaiming any legal responsibility for the fitness for a particular purpose. Warranty courts have not been loathe to override this second warranty disclaimer.

No amount of subtle and clever legal draftsmanship can prevent a vendor from escaping the net of legal liability where a court "reasons" such liability should be imposed. To be sure, a vendor's exposure can and should be limited in circumstances legitimately warranting limitations on legal risk exposure. □

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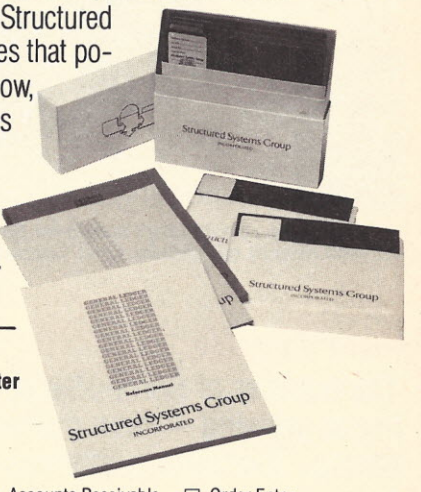

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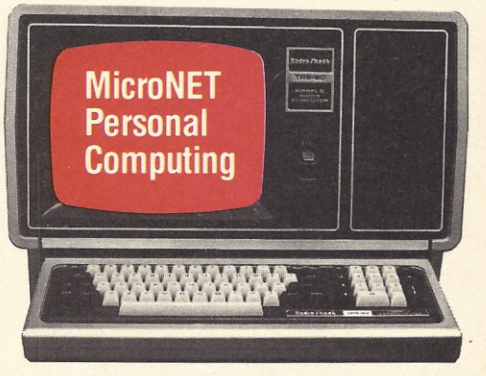

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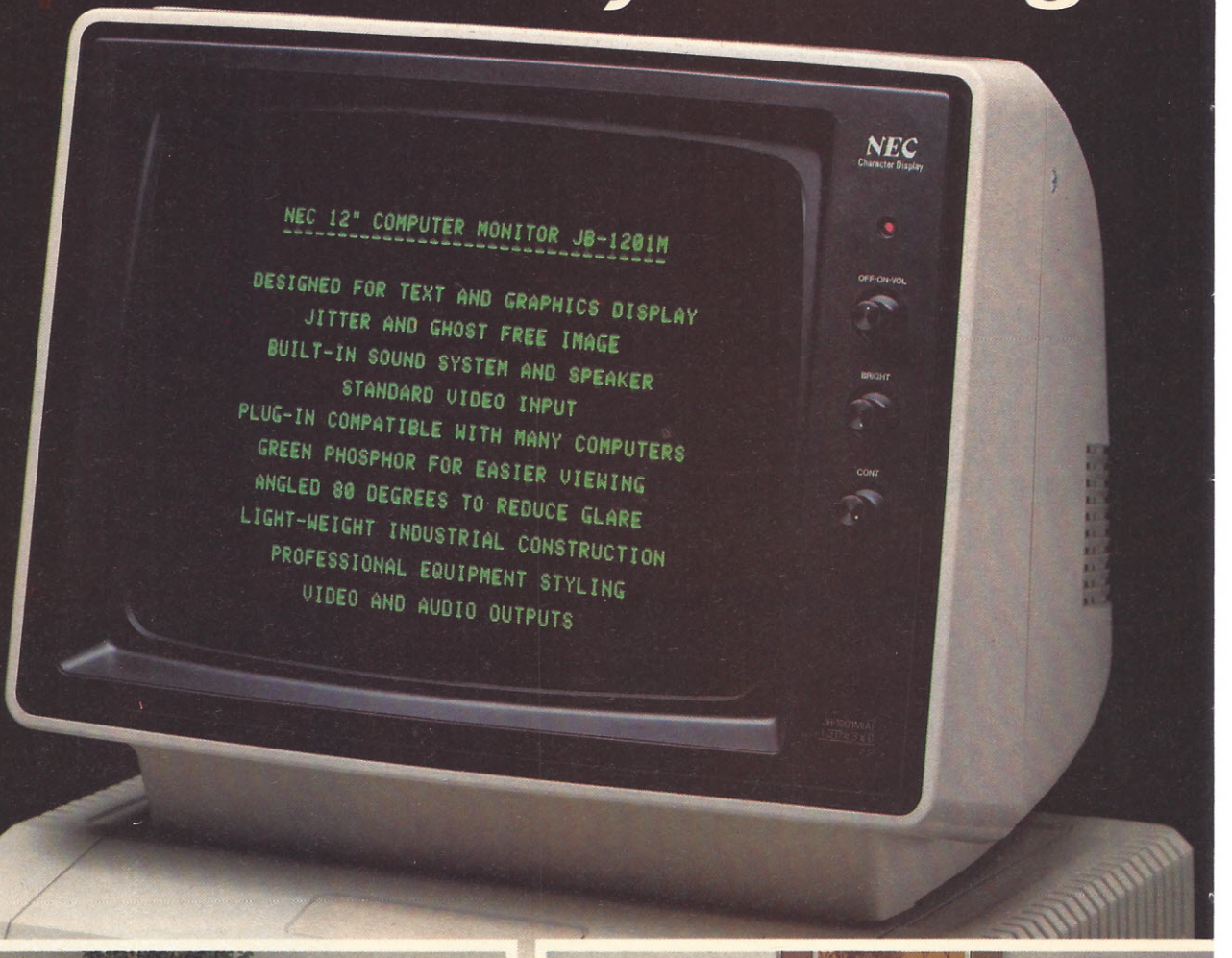

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CIRCLE INQUIRY NO. 65

What's Your Reading Level?

Educators work to improve the reading level of students. My goal is to know the student's reading level and write at that level. This month's game looks at things you read each day to determine what reading level the author is writing for. If you write, you can use the program to see what reading level is required to understand your material.

Much research by business and communication consultants has been done to help writers communicate better. Robert Gunning was one of the more famous of these researchers. He developed the Fog Index. This index tells a person how well or poorly he communicates.

To use the index, take a 100 word sample of your writing and apply this equation to it:

FOG INDEX = WC/S + HS

WC is the number of words, S is the number of sentences, and HS is the number of high-syllable words (three or more syllables). The higher the index, the harder your writing is to understand. It will contain words and sentences that are too long. Often, the Fog Index is multiplied by .4. This is a rough estimate of grade level. A Fog Index of 20, for example, converts to a reading level at about eighth grade (.4*20 = 8).

The year before high school is an important one. The level of material written for the general adult population should not exceed the eighth grade. Material written within specific fields or for specific audiences may have different cut-offs. For example, business memos and letters should never require a reading level beyond the twelfth grade. (Doctors, lawyers, and politicians clearly have no restrictions. They write and speak above all of our heads.)

Write at certain levels

This does not mean that the average adult reads at an eighth grade level, or that the average businessman reads poorer than a freshman in college. It does mean that a writer who wants to be clearly understood will write at these levels. His job is to communicate, not give his readers a test. Instructions are often written at much lower reading levels. What is the reading level for this: *Wet hair. Lather hair. Rinse. Repeat?* According to the program, it can be read and understood by someone in the first grade.

Now it is your turn to play the game. Get the program running and use it on your favorite reading material. Type the material in and press return after each sentence. When you have finished, type CTRL-C and the program will repeat the text and tell you its grade level. Now use it on the last thing you wrote. How about an article in a favorite magazine? Use it on a politician's speech or a legal contract. You can have a lot of fun finding out how well different kinds of people communicate.

The program is divided into three parts. Lines 30 to 96 accept the text that you want analyzed, lines 105 to 170 do the analysis, and lines 180 to 250 display the results. Let's look at the third part first and then return to the other two.

The reading level equation is on line 190. Notice that it is slightly different from the equation in the text. This is because I didn't want to require exactly 100 words in the sample. Multiplying the number of long words by (100/WC) allows the use of any number of words in the sample. Notice that if the number of words is 100, then 100/100 = 1 and the equation is the same.

Looking at special cases

Look at lines 185 and 186. Whenever you write a program that must divide by a number, always test for zero. Otherwise, your program will fail. Since the program can't disallow the use of a single word or incomplete sentence as the text, it will assume that such a fragment is a complete sentence. Lines 240 and 245 are also special. Printing CHR$(7) rings the Apple computer's bell. The equation on line 245 takes RL and rounds it to the nearest tenth. As examples, 3.33333 would become 3.3 and 6.66666 would become 6.7.

The remainder of this section of the program prints the results. Note that WC is the number of words, S is the number of sentences, and HS is the number of long words.

Lines 40 through 96 form the main input loop. This section of the program uses a novel method for storing text. It does not use either a string or number array. Instead, it stores the text directly into memory beginning at location 17000. Microsoft Basic does not allow a string longer than 256 bytes. Using strings will also cause the program to periodically pause causing a loss of data for a fast typist. This method bypasses these problems.

If you are putting this program on a computer other than an Apple, you will have to change the location specified in line 30. For an Atari, anything over 5000 should work. On a TRS-80 model I, try a value over 24000. For a TRS-80 Color computer, try a value over 2500.

Line 40 waits for you to type a key. The key pressed is put in K$. If the key pressed is the forward arrow (→ or ASCII = 21), then line 50 skips down to line 94 where the program prints the current contents of memory. Likewise, if the back arrow (← or ASCII = 8) is pressed, and if the program is not at the beginning of the text in memory, then lines 72 to 76 are used. These lines back up the memory pointer and back up the cursor on the TV screen. In this way, the program lets you use the back arrow to go back and correct a mistake while using the forward arrow to retype letters that are still correct.

If neither the → or ← keys are pressed, the key is placed in memory on line 80 and checked to see if it is a CTRL-C on line 90. If it is, then no more text is coming and the program goes on to analyze the reading level. If the key was not the ← or CTRL-C, line 94 prints the key on the screen and line 95 updates the memory pointer for the next key typed.

The FOR loop from line 110 to 170 picks out the text one letter at a time from memory, prints it, and analyzes it. If the letter is a blank, then lines 142 to 148 analyze the previous word. Because determining the number of syllables is too hard for a simple program, a reasonably accurate approximation is used. Words longer than eight letters are considered to have three or more syllables. Line 144 updates the word count. The program avoids counting multiple blanks as words by doing this only if the number of letters is greater than zero.

The program avoids counting multiple blanks as words...

Each sentence typed must be ended by typing RETURN (ASCII = 13). When this occurs, the number of sentences is increased in line 154. Also, the length of the last word is decreased by one in line 152. This prevents counting the punctuation at the end of the sentence as part of the word length. The last thing to do at the end of a sentence is to count the word. This is done by jumping back to line 142.

Finally, if the letter is neither a RETURN nor a space, it is assumed to be part of a word. In this case, line 160 adds one to the length of the current word.

I would like to thank Mr. Ed Johnston of Milwaukee for the initial version of this program. He is a writer who often uses it to keep his own communication clear. Thanks also to Mr. Dale Dellutri of Chicago for additional insights into the Fog Index and its use in business communication. □

Program listing

```
5  REM

READING LEVEL PROGRAM


6  REM

KEEP TEXT IN MEMORY STARTING
  AT LOCATION 17000
```

```
30 X = 17000
31  REM

 TEXT INPUT LOOP:
   HANDLE TEXT, ->, AND <-

40  GET K$
45  REM

IF ->, THEN USE MEMORY

50  IF  ASC (K$) = 21 THEN 94
65  REM

IF <-, THEN BACKUP

70  IF  ASC (K$) <  > 8 THEN 80
71  IF X = 17000 THEN 40
72 X = X - 1
74  PRINT K$;
76  GOTO 40
77  REM

PUT TEXT IN MEMORY

80  POKE X, ASC (K$)
85  REM

IF CTRL-C, THEN END-OF-TEXT

90  IF  ASC (K$) = 3 THEN 105
91  REM

PRINT TEXT

94  PRINT  CHR$ ( PEEK (X));
95 X = X + 1
96  GOTO 40
97  REM


 COMPUTE GRADE LEVEL STATISTICS


105  HOME
110  FOR A = 17000 TO X
120 S$ =  CHR$ ( PEEK (A))
121  REM

PRINT TEXT

130  PRINT S$;
135  REM

BLANKS SEPARATE WORDS

140  IF S$ <  > " " THEN 151
142  IF WL > 8 THEN HS = HS + 1
144  IF WL > 0 THEN WC = WC + 1
146 WL = 0
148  GOTO 170
149  REM

RETURN KEY ENDS SENTANCES
  AND WORDS

151  IF  ASC (S$) <  > 13 THEN 160
152 WL = WL - 1
154 S = S + 1
156  GOTO 142
157  REM

EVERYTHING ELSE IS PART OF
  A WORD

160 WL = WL + 1
170  NEXT A
171  REM


DISPLAY STATISTICS AND LEVEL


180  REM   READING LEVEL IS .4 * (WC/S + HS*(100/WC))
185  IF S = 0 THEN S = 1
186  IF WC = 0 THEN WC = 1
190 RL = .4 * (WC / S + HS * 100 / WC)
200  PRINT : PRINT : PRINT
210  PRINT WC;" WORDS"
220  PRINT S;" SENTENCES"
230  PRINT HS;" WORDS WITH THREE OR MORE SYLLABLES"
240  PRINT  CHR$ (7)
245 RL =  INT (RL * 10 + .5) / 10
250  PRINT "THE READING LEVEL IS ABOUT GRADE ";RL
260  END
]
```

THE MICRO-MATHEMATICIAN

by Dr. John C. Nash

Determining Floating-point Properties

The surprising reality of many results obtained by calculations on computers is that they contain an unknown amount of error. Quite apart from the possibility of programming mistakes, data errors or faults in the operation of the machine or the programming language, such error is the consequence of floating-point arithmetic—the use of numbers having a finite length.

Before abandoning your computer for a set of sharp pencils and several acres of paper, note that the situation is not hopeless, although some programmers try awfully hard to compute erroneous answers from good data by using dubious methods. In this column and others to follow, I shall attempt to warn of some pitfalls. Avoiding them is easy in about half of the cases, but unfortunately a lot of work in the rest. We begin with the question of how a particular machine stores or represents numbers, since there is no sense in trying to calculate a result if the machine cannot store it in a sufficiently precise way.

Machine arithmetic is very similar to the grade school kind (before the electronic calculator anyway). The simplest variety is operations on unsigned integers—positive whole numbers. In such operations, we need some rules to handle exceptional cases because the size of numbers must be less than some limit imposed by the physical boundaries of the machine or the piece of paper we are using. Usually we settle for convenient limits such as 255 (= $2^8 - 1$) or 9999 (= $10^4 - 1$). Also we have to know how to handle additions or multiplications that result in numbers too big to represent (overflow), subtraction of a number from one smaller, and divisions when the remainder is not zero.

By allowing numbers to have a sign, a richer set of possibilities is obtained. The decimal point, or more correctly the radix point, permits fractions to be expressed, though the possible values that may be represented are still restricted by the limitations on the number of digits.

Computer users are well aware of scientific notation where 123.48 is written 1.2348E+2 or .12348E+3. That is, the decimal point in .12348 is to be moved 3 places to the right to recover the original number. The fraction .12348 is called the mantissa; +3 is the exponent. If the decimal point is always at the front of the mantissa, there is no need to write it down. Similarly, the E need not be stored if the number of digits in the mantissa and exponent are fixed. For instance, a 6 digit mantissa and 2 digit signed exponent give

+123480+03

as the representation of the example. Quite often it is useful to treat the exponent as a positive integer by assuming that every representation will have a fixed shift value added to the true exponent. Supposing this shift to be 50 in our example, the "excess 50" representation of the exponent is now 53, and the representation now becomes

+12348053

where we no longer keep the sign on the exponent.

Typically, the internal representation of floating-point numbers is expressed by the function of the bits in a string of given length. Using 32 bits of each number, we might have

Bit 1	sign of number
Bits 2-24	mantissa
Bits 25-32	excess 128 exponent

This example has 23 bits in the mantissa, and suggests that the radix or base of numbers is 1 bit, that is, base 2. An alternative arrangement of the string of 32 bits might be

Bit 1	sign of number
Bits 2-8	excess 64 exponent
Bits 9-32	mantissa

In this latter example, it is possible that the 24 bit mantissa can be used in the following ways

24	1	bit digits - base 2 (binary)
12	2	bit digits - base 4
8	3	bit digits - base 8 (octal)
6	4	bit digits - base 16 (hexadecimal) or binary coded decimal (base 10)
4	6	bit digits - base 64
3	8	bit digits - base 256
2	12	bit digits - base 4096
1	24	bit digit - base 16777216

The actual argument of the information is immaterial to the end results of calculations, but how it is operated upon may be critical. The general structure (even if the arrangement is different) is

- sign of number
- exponent - either signed or excess some shift
- mantissa made up of C radix digits
- an assumed position for the radix point in the mantissa

If we assume that the radix point is to the left of the mantissa, then for a given structure we can work out the limits imposed on our results by the representation of floating-point numbers. Just as scientific notation of numbers places the decimal point immediately ahead or behind the leading non-zero digit, we will assume the radix point to be to the left of the first digit in the mantissa, thereby requiring this digit to be non-zero. Such a normalization is usually required before numbers can be stored or used, although some machines allow users certain kinds of operations with un-normalized numbers. Since normalization in a binary machine places a 1 automatically in the first position of the mantissa, some quick-thinking engineers have designed systems that simply assume that it is there. This squeezes one extra bit of information out of every number—a factor of 2 in precision in results.

In the 32 bit example with 24 bit mantissa (binary), the smallest representable absolute number has a single binary digit (bit) in the first position, so that the mantissa has the decimal value of 0.5. The smallest exponent is stored as 0, hence its value is −64. The smallest value we can represent in this system is thus $0.5 * 2^{-64}$ which has the approximate value 2.71051E−20. Similarly, the largest representable value will have all ones in the mantissa and an exponent stored as 127 in excess 64 form to represent +63. Hence, the value is $(2^{63}) * (2^{24} - 1)/(2^{24})$ which is approximately 9.2337E+18. Note how the mantissa is evaluated as a fraction.

With a larger radix, say 16, the smallest and largest representable numbers are $(1/16) * (16^{-64})$ which is roughly 5.39761E−79 and $(16^{63}) * (16^6 - 1)/(16^6)$ which is roughly 7.23701E+75.

Larger radix values give a larger range of representable numbers, but have a corresponding disadvantage in the relative precision of numbers because we are working with bigger units. To see this, think of a 4 decimal digit mantissa (the exponent does not matter here) which is recon-

figured to work in base 100. The base 10 exponent will be denoted by a big E, the base 100 by a little e. Then we have the following representations.

Number	Base 10 representation	Base 100 representation
9999	.9999E+4	.99 99 e+2
1	.1000E+1	.01 00 e+1
0.001	.1000E−2	.10 00 e−1

For visual convenience, the digit pairs making up single base 100 "digits" have been separated. Now consider the addition 1.0 + 0.001 in each of the above representations.

Base 10	Base 100
.1000 E+1	.01 00 e+1
.0001 E+1	.00 00 10e+1
.1001 E+1	.01 00 ??e+1

We note that the base 100 calculation can only be performed if we are allowed to extend the working area by another base 100 digit. Further, the result cannot be expressed in 2 base 100 digits, no matter what steps we take at intermediate levels of the calculation.

A convenient way of describing this phenomenon, which is at the root of all round-off errors, is the machine precision for a given form of floating-point arithmetic. The machine precision, call it B, is the smallest representable positive number such that the floating point representation of 1.0 + B is greater than the similar representation of 1.0. We can write

$$f1(1.0 + B) > f1(1.0)$$

as the condition to be tested. It is quite easy to persuade most computers to tell us the machine precision and radix, as well as something about whether they round or truncate the results of calculations.

It is more difficult to get any information about the exponent range, since we have to force the machine into error conditions. However, it has been my experience that problems requiring very large or small numbers are quite rare and easily handled by keeping exponents or scaling factors in special variables. Problems with a need for more precision than a given computing system can offer are much more common. For example, IBM Fortran single precision arithmetic uses a radix of 16 (hexadecimal arithmetic) and has 6 hex digits in the mantissa of each number. Calculations on only a million dollars will result in errors in the cents, which may be cause for concern if mortgages are computed in this arithmetic.

Listing 1 gives a program in Basic to determine the machine precision. This particular version was run on a North Star using 8 digit FP Basic—that is, it employs the special floating-point board to carry out the arithmetic. Listing 2 gives the results on this machine. The program is based on work by Prof. M. Malcolm at the University of Waterloo.

Program PRECN starts by obtaining an approximate machine precision, which is a number no larger than twice the machine precision. This is calculated in lines 60 to 130 and saved in B. If A is less than the radix, A + B will be greater than A. But once A is the radix, B will again drop off the end of the result which must be stored. Given the radix, it is easy to repeat the machine precision calculation in lines 230 to 270 to obtain the true machine precision and count the number of radix digits C. While the machine precision is given by the formula $B = A^{(1-C)}$, this is not a good way to compute it, since it involves approximations for the exponential function. This is illustrated at lines 310, 320. Finally, the program tries adding a fraction of the machine precision to 1.0 to see if the results are rounded or truncated (also called chopped).

Note that we could make the comparisons of 1 + B with 1 directly, rather than through the intermediate variable D. However, this risks the possibility of guard digits in accumulators used for arithmetic. Indeed, this program started life on a Radio Shack pocket computer, where it showed the little

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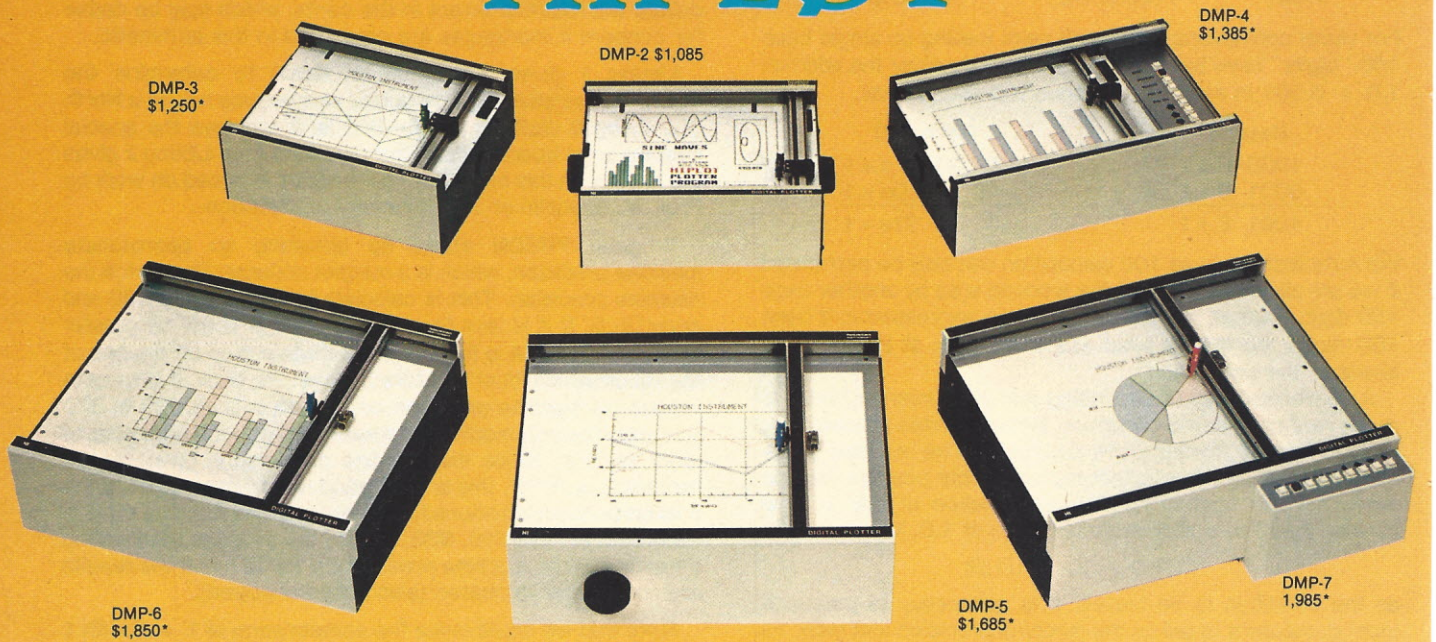

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*U.S. suggested retail prices only.
**DMP 2, 3 and 4 UL listed
DMP 5, 6 and 7 UL listing pending

machine to use 10 digit rounded decimal arithmetic. Changing the comparisons at lines 110, 180, 350 and 400 so that the additions are done in the IF statement gave the results that arithmetic was truncated 12 digit decimal. To measure the representation of floating-point numbers, we must force the machine to store the sum before the comparison is made.

I have personally had only one experience where this approach to finding the machine precision has failed. In a Tektronix 4051 graphics system, engineers wished to reflect the reality of our imprecise world, and built a FUZZ factor into all comparisons. The default value of the FUZZ was such that the program used to calculate the machine precision said the radix was 256, when in reality the machine worked in binary, yet the manuals implied that arithmetic was decimal. Turning off the FUZZ with a special command let the program find the correct values.

Because manuals may be in error or not up to date, PRECN can be a useful tool to find out what is going on. In the next column, I will take a look at the combination of errors in arithmetic operations and suggest some dangers to watch out for.□

Listing 1

```
10 REM PROGRAM PRECN
20 PRINT "MACHINE FLOATING POINT ARITHMETIC PROPERTIES"
30 PRINT
40 PRINT "      J.C.NASH - JANUARY 1981"
50 PRINT
60 LET A=1 \ REM STORE FOR THE RADIX
70 LET B=1 \ REM THE MACHINE PRECISION TEST VALUE
80 REM START LOOPING TO MAKE B SMALLER
90 LET B=B/2
100 LET D=A+B \ REM D IS A TEMPORARY STORE FOR FL(A+B)
110 IF D>A THEN 90 \ REM STILL COMPUTES OK, REDUCE B
120 REM B HAS DROPPED OFF THE END
130 LET B=B*2 \ REM RECOVER LAST OK VALUE
140 REM NOW FIND RADIX BY INCREASING A UNTIL WE AGAIN
150 REM LOSE B OFF THE END OF THE ACCUMULATOR
160 LET A=A+1
170 LET D=A+B
180 IF A+B>A THEN 160 \ REM GO ROUND UNTIL NOT OK
190 PRINT "RADIX=",A
200 REM USE RADIX TO GET EXACT MACHINE PRECISION
210 LET B=1 \ REM AGAIN THE MACHINE PRECISION
220 LET C=0 \ REM RADIX DIGIT COUNTER
230 REM BEGIN LOOP AGAIN
240 LET B=B/A \ REM NOW WE DIVIDE BY THE RADIX
250 LET C=C+1
260 LET D=1.0+B
270 IF D>1.0 THEN 240 \ REM THE TEST
280 PRINT C," DIGITS",
290 LET B=B*A \ REM RECOVER LAST OK VALUE
300 PRINT "  MACHINE PRECISION=",B
310 LET D=A^(1-C) \ REM AN APPROXIMATION
320 PRINT "APPROXIMATE MACHINE PRECISION=",D
330 REM CAN TEST FOR ROUNDING IN SOME CASES
340 LET D=(1.0+(B/2)) \ REM TRY HALF B
350 IF D>1.0 THEN 380
360 PRINT "TRUNCATES"
370 GOTO 400
380 PRINT "ROUNDS"
390 REM TRY AGAIN WITH DIFFERENT FRACTION
400 D=(1.0+(B*(A-1)/A))
410 PRINT "ANOTHER TRY WITH A DIFFERENT FRACTION"
420 IF D>1.0 THEN 450
430 PRINT "TRUNCATES"
440 GOTO 460
450 PRINT "ROUNDS"
460 STOP
470 END
```

Listing 2

```
MACHINE FLOATING POINT ARITHMETIC PROPERTIES

      J.C.NASH - JANUARY 1981

RADIX= 10
 8 DIGITS  MACHINE PRECISION= .0000001
APPROXIMATE MACHINE PRECISION= 9.9999966E-08
ROUNDS
ANOTHER TRY WITH A DIFFERENT FRACTION
ROUNDS
```

Learning with Micros

by Louis E. Frenzel

Real Educational Software

The major roadblock to the use of computers in education is good software that will teach. There is a tremendous need for canned programs that teach specific subjects. I am happy to report that there are a number of organizations beginning to develop and sell such programs.

Development Software. One of the reasons there may be a shortage of good learning programs is the lack of software used to create computer aided instruction (CAI). Most CAI is written in Basic, but programming CAI in Basic is awkward. Special languages such as PILOT have been written for developing CAI, but are not widely available.

There is some evidence that new languages are being developed and this could be a breakthrough that will make it easier for others to develop CAI. There are many teachers and other individuals who know a subject and are capable of writing on it or teaching it. However, these individuals simply do not know how to write a program or care to learn. Special CAI development languages would be desirable for them. Such languages should be fast to learn, easy to use, and almost transparent to the user. CAI authoring systems include:

Bell and Howell Co., Audio-Visual Products Division
7100 N. McCormick Rd., Chicago, IL 60645
(312) 262-1600 or (312) 673-3300

1. *Program name:* Genis I

   Purpose/content: General purpose educational software development system for creating and presenting CAI. Consists of the Courseware development system, a self tutoring authoring language which allows teachers to create special curriculum materials and a presentation system for delivering the materials to the student. Genis I also consists of MARKPILOT, a version of the PILOT CAI instruction language.

   Computer/format: Bell & Howell microcomputer system.

   Price: $300

   General comments: The Bell & Howell microcomputer is a private labeled version of the Apple II. Presumably, Genis I will also run on an appropriately configured Apple II.

2. *Program name:* Pass

   Purpose/content: Professional Authoring Software System is a part of the Managed Interactive Training System. It is an authoring language designed to facilitate the creation of CAI programs. It can accommodate color graphics as well as text and has video tape and disk interface capability.

   Computer/format: The Bell & Howell microcomputer (private labeled Apple II).

   Price: $450

Teaching Programs. It appears that most of the CAI available for current microcomputers are drill and practice programs for elementary school children. Very little has been done in the way of creating in-depth programs for the high school and college levels. Neither has there been much done in the way of creating learning programs for adults. However, progress is being made:

Teach Yourself by Computer Software
40 Stuyvesant Manor, Geneseo, NY 14454
(716) 243-3005

Programs available:

1. Individual Study Center — A series of self teaching programs for a wide variety of subjects including French, Spanish, German, English grammar, history, geography, biology, spelling, basic math and amateur radio.
2. Earth Science Series — Eleven independent teaching modules designed to teach the fundamental concepts of the earth sciences including topics such as gradient, heat energy, latitude and longitude, chemistry, stream erosion, water budget, seismic waves, earth history, seasons, meteorology and per cent error. The series also includes the Lab Aid program which transforms the computer into an intelligent calculator with 21 preprogrammed formulas most often used in earth science studies.
3. T.E.S.T. — This is a special program that allows the user to create exams of up to 35 questions. Also included is a test and drill program designed to present the test thus created.
4. Mind-Step — A two part self instructional CAI course in memory improvement. Improves your ability to remember facts and data, recall names and faces, and learn anything more quickly.

Level: junior high, high school, community college, adult.

Computer/format: All programs are available in TRS-80

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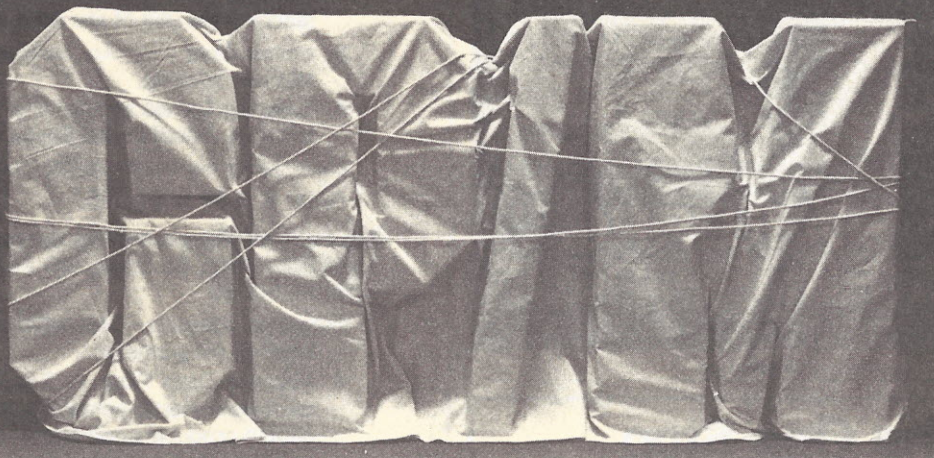

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level II Basic with 16K cassette or disk. Individual Study Center and Mind-Step programs are also available in Apple II formats with both Applesoft in ROM and Apple Plus formats.

Prices: 1. Individual Study Center — $39.95; individual subject tapes — $4.95
2. Earth Science Series — $59.95
3. T.E.S.T. — $11.95
4. Mind-Step memory improvement course — $24.95 (Part I) $29.95 (Part II)

Edu-Ware Services Inc.
22222 Sherman Way, Suite 102, Canoga Park, CA 91303
(213) 346-6783

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3. Compu-Spell — An instructional program that teaches spelling.
4. Teaching Games (simulations) — Including Terrorist, Network, Windfall and Space.

Level: junior high, high school, community college, adult.
Price: $15.95 to $49.95

Educational Programming Systems
1328 Baur Blvd., St. Louis, MO 63132
(314) 991-0300

Programs available: CompuCourse individualized CAI learning programs in:

1. Planning Cash Flow — Teaches how to use your microcomputer to combine accounting and operating data to produce a comprehensive picture of present and expected cash flows.
2. Personal Financial Planning — Shows how to use your computer to manage and plan your finances for a secure financial future.
3. Improving Memory Skills — A program that helps you learn to double or triple your power of retention.

Level: adult
Price: $99.95

Utility Programs. A special category in educational software that includes anything from programs for creating tests, managing student records or scheduling classes. This is a relatively new and untapped market. In many ways, utilities software may be more important and useful than the teaching programs. Few programs are available in this category, but some good ones are beginning to appear.

Advanced Technology Applications
4296 Tambor Ct., San Diego, CA 92124
(714) 569-2693

Program: The Test Bank — A computer assisted test construction program for microcomputers. This sophisticated program allows the creation of a wide variety of different types of tests.

Level: school, business or industrial

Computer/format: Exidy, TRS-80 models I and III (disk only) available now. Apple II version available summer 1981.

Price: $450

Since I have not personally reviewed these programs, I cannot vouch for the quality of the materials or the credibility of the manufacturers. Nevertheless, it is encouraging to see such software coming forth. □

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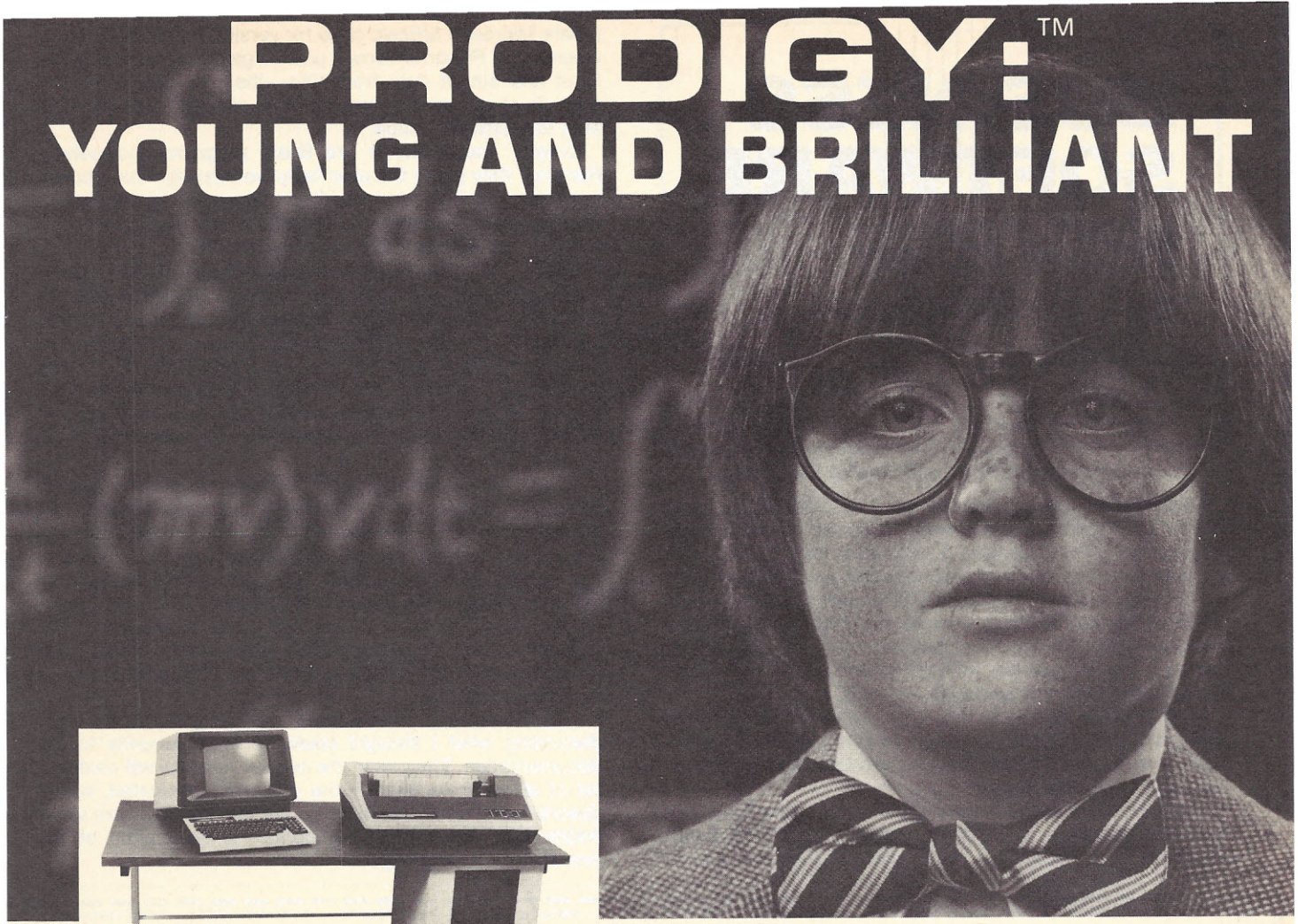

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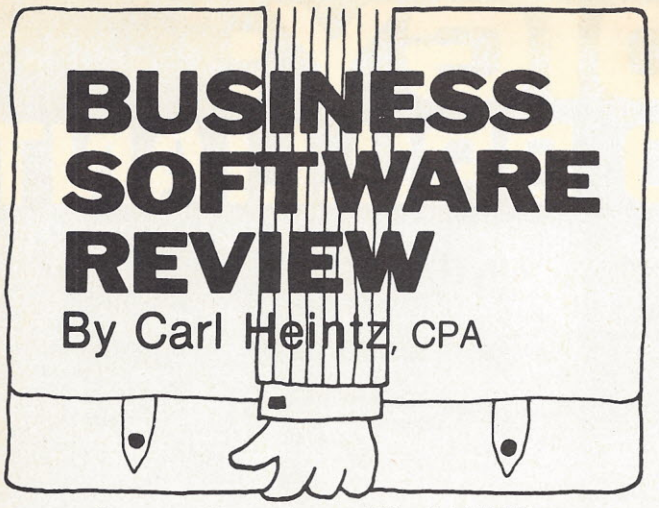

Program Generator and Useful Utilities

This month's review focuses on two products of great interest to the micro user who wants to do custom applications programming. The packages, The Creator and the Reportor, are produced by Complete Business Systems, Chicago, IL.

The programs are not intended for those who don't want to do some digging into the techniques and tools of programming in Basic. They are not recommended as "first programs"; they may be of particular interest to those who make their livings in programming and systems sales.

Most professional programmers have a toolkit that includes code generators. These are programs that take the specifications of an applications program and produce the applications language code necessary to run it.

Many excellent applications programs are currently written in interpretive Basic, the foremost dialect being the Microsoft version. Creator is a code generator that allows a user to create Microsoft MBasic code for version 5.0 or higher. The Creator and Reportor allow a user to generate programs that input and output data from files—the two most important aspects of any applications program, and generally the most time consuming to code.

Creator and Reportor are Basic programs themselves. Running, they guide the user fairly well through the program generation routine. A manual accompanying the programs explains fairly well what the operations are, and is helpful in allowing the user to make option selections.

One of the most important aspects of any code generator is the architecture of the programs created. There is little use to having a code generator that spews out undocumented, unreliable and unmodifiable code. Creator's makers took great pains to insure that the code generated from their programs is well documented. It's full of comments and REM remarks. The product is well laid-out and modular. It doesn't take too much study to see what the various sections of the program are for.

A word to the wise, though: to really understand what is going on in the program is not easy for the novice programmer, mainly because of the sophistication of the code. Although the authors state that modification is easy, it won't be unless the person who attempts it has had some exposure to advanced Basic. For those with fluency in the language, modification is a snap. There are even comments in the generated code about suggested applications—in one case "here would be a good place to have a little print routine if you want a print out."

I spent several phone coversations with the authors discussing what I thought could be improvements to the documentation. They claim the newest versions will contain a list of all variables used in the programs generated, with a description of what the variables are and how they are used. Additionally, the manual will contain a description of the overall flow of the program.

The importance of architecture has a more fundamental aspect to it than the cosmetics of the code created. Issues of vital concern include the nature of the files created, how they are accessed, the nature of the input process, the ability to interact multiple files, edits, and the ability to output information in the form desired by the user.

The Creator uses direct files, as opposed to sequential files. The difference is one of fundamental importance, since each type of file has unique characteristics that influence applications. Sequential files are the simplest to create, the easiest to code and the clumsiest to integrate into a slick applications program. To use them effectively, one must generally utilize lots of sort routines, and when a record is to be accessed, you must read the whole file from record 1 sequentially to get to it.

Direct files are the choice of most professionals for sophisticated applications. The difficulty lies in the nature of their access; each record has a record number. If a program knows which record number it needs, it is a simple matter to access it without reading any other. The difficulty comes in designing a scheme to correlate record numbers (a software dependent function) and some form of application data piece. Creator utilizes a hashing routine that takes a key through some number crunching in the program equates it to a record number. The scheme is very effective, although it does take time to implement.

Standardized record access

When running Creator to generate a program, the number of records to be used is asked, as is the size of the record, whereupon, Creator sets up a little program for the user to later initialize his data disk. (The data disk can be on the program disk or on any CP/M allowable A-E disk.) Initialization basically results in setting up a dummy record, filling it with blanks and allocating out the record space. The effect is to make record access essentially the same whether the file has one record or close to being full, thus preventing the situation of trying to put 150K of data on a disk with only 100K of space left. The programs also prevent the disaster of opening a file on a disk sector that is bad, since the initialization program in essence tests this by putting dummy characters in the file.

The program can deal with only one file, meaning that it is not possible to update two files at one time or link files, or do any fancy file maneuvers. It will handle the needs of most applications, though.

It allows the user to include special video effects in the generated programs. Reverse video, blinking video, underlining, and up to four user defined video attributes are allowed. The degree of video usage is limited only by the user's equipment and imagination. The effect on the resultant applications program can be dramatic, especially in applications where the user must interact extensively with the CRT during input.

The effectiveness of any code generator also depends upon the ability to include edits. Creator has excellent edit capabilities, limited only by the user's creativity and ability to carefully read the instructions. Some of the edits include: ranges, less than or greater than, numeric alpha, length of response, character comparison and format.

Simple or compound edits can be invoked. The user can have his response subject to calculations, range tests, format (such as dates), even rejected if no entry (carriage return). The programmer has complete flexibility with error messages; he writes his own. In addition, an error can be defined as "fatal," in which case the user must reenter the response, or "non-fatal," in which case the user just gets a warning. The Creator can accept any number of edits per entry. Each edit test can have its own error message.

Creator allows the programmer to use packed files—a critical step for many applications. Using packed fields basically results in a smaller record and file size. Access to the records in a file can also be speeded up. Creator allows

for automatic packing of half precision, integers, single and double precision numbers. There is even a special dollar-packing specification with a two decimal point automatic roundoff.

The applications programs are menu driven. The menu is produced by the Creator itself, and includes provisions for entering data, looking up data, updating records, deleting them and reorganizing the file (to save space after deleting a lot of records). The menu resides in a file by itself (with a file type .MSG), so it's not too hard to get to and modify if the user has a good editor. The menu does not contain any entries to generate reports.

The Reportor programs are about as easy to use, although a little practice is necessary to fully realize their potential. The authors indicated that I had one of the first editions at the time of my review, and the manual was in the process of being expanded to include more examples.

Reportor does not have to be used for just Creator programs, although more data input about the file type is necessary if used for other files. If a Creator-generated file is to be read, the Reportor automatically incorporates the file parameters defined by the user during Creator. (It accesses Creator-generated files that contain data file specifications, and incorporates them into its operations.)

Reportor allows the user to select fields from a file and prepare reports from it. The reports can be directed to the screen, to the printer or both. The number of columns and lines are limited solely by the printer/terminal. Pagination of reports is provided, as are user-defined headings. The number of lines to be printed on a page and the spacing are under user control.

Flexible data manipulation

Reportor is capable of producing complex manipulation of the data from the file; the whole range of mathematical functions can be applied to any field. Columns can be added, subtracted, multiplied and converted from strings to numbers, numbers to integers, rounded off, or any combination of the above. Boolean operators can be applied (if, and, or, Xor). Using these operators on the data, fields can be manipulated to the user's wildest demands.

Missing, however, is a simple method of generating subtotals. The authors stated that in a future release this will be included. At this point, a user must be creative and apply the tools at hand to achieve any successful subtotaling capabilities. It's not difficult to do, but it does take some independent and creative thought. The hooks are left for programmers to add totals, and statistical data.

The Reportor essentially creates a tabulated list of data. The columns are defined and the data from selected files is listed. This is analgous to the reports generated from some of the data base systems that have been reviewed in this column. That is, in some respects, the only weakness of the system since it really doesn't let the user go far enough in the formatting of reports. An ideal system would allow the production of Reportor-type reports. It would also allow the user to define rows as well as, or in place of, column names. (For example, a balance sheet has rows defined and columns of variables.) Ideally, this should be in a format allowing the user to specify a format with a screen editor. Where variables are to go, a control code would be placed (such as a //v1//). The user could then define //v1// as the result of certain arithmetical operations, combinations of fields, or whatever.

The manuals for the two packages have to be among the most unusual in the marketplace—they consist of a diskette each with an MBasic program to access a text file. A reader can scan the manual, print out sections, or alternatively have the program search for materials based upon key words. While the idea is unique, most users will probably dump the whole thing out on the printer as soon as received.

Creator and Reportor seem to be the only commercially available programs for generating Microsoft MBasic 5.0 code. The cost of the package (around $300) makes them attractive from a value received to cost ratio. □

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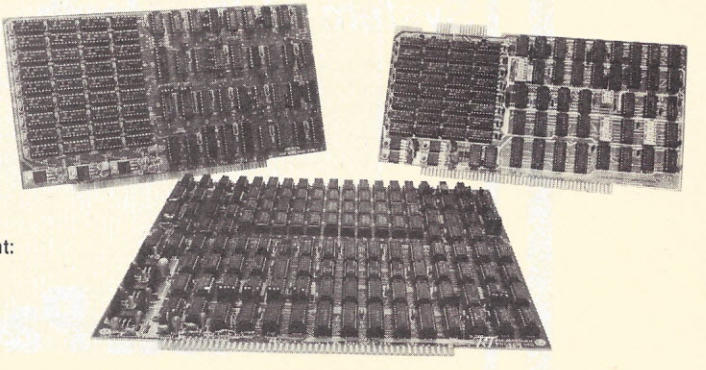

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System of the Month

Hewlett-Packard HP-83A

by Tom Fox

The HP-85, the first of Hewlett-Packard's series 80 computers, bears a resemblance to the IBM 5100 that is so strong it can hardly be called a coincidence. Its compact all-in-one package, measuring just 16½ in. wide by 6¼ in. high by 18 in. deep, contains a complete, functioning computer—including peripherals. Not only is there a full-sized keyboard generously sprinkled with special function keys, but a tiny cathode-ray tube (CRT) display screen, printer and cassette tape drive for data storage. All but the keyboard suffer the compromises needed to ensure portability. The 5-in. CRT screen can hold but 512 characters in a 16 by 32 format, and the thermal printer is limited to 32 characters in width. (Both, however, support a crisp graphics mode with a 49,152-dot resolution.)

The tape cassette is a high-quality unit, storing 210K bytes of data per cassette at a transfer rate of 650 bytes per second. Although far superior to the more familiar audio cassette seen in home computers, the performance of the data cassette is well exceeded by

even the simplest of floppy diskette drives. Inside are the central processing unit (CPU), memory and interfacing circuitry. A Basic language interpreter is contained in read-only memory (ROM), and thus is a permanent part of the computer.

The system is an appealing package. At $3,250, it is priced above the range of most home purchasers, but has found a spot on workbenches of scientists and engineers all over the world. Inevitably, these machines have sprouted accessories and attachments as their owners became more familiar with their computer's native capabilities. High on the list of popular additions are floppy diskette mass storage devices and standard-sized hard copy printers. Once these are added, the internal printer and cassette tape drive become redundant and are seldom used.

Ever responsive to its customers' needs, the company recently introduced a stripped down version called the HP-83A. It's identical to the HP-85, except for three distinctions: no printer, no tape cassette and $1,000 lower in price. This cash bonus can be applied to the now-necessary peripheral devices. The HP-83A is more of a traditional computer than its elder brother, in that it needs an external printer and mass storage device to make it complete.

For those who need an even more basic version, there's the HP-9915A. This computer consists of the CPU and memory of the more complex units and the CRT display alone, packaged in a military-looking rack mountable box. The price for this version begins at $1,675, and the company is encouraging sales to OEM customers.

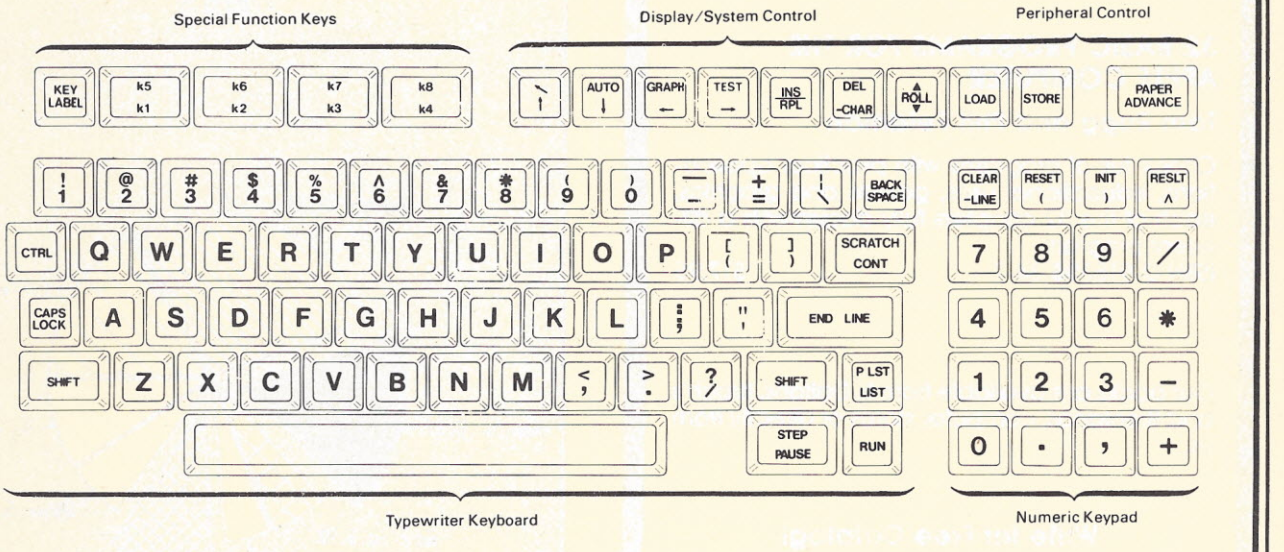
H-P has traditionally provided support to engineering, scientific and financial professionals with bunches of applications software of the mathematical analysis sort. General business programs weren't often available—a shame, because the HP-85 is at least as capable a computing engine as many microcomputers that have established themselves in the business community. This situation changed dramatically, however, with the company's purchase of Software Art's VisiCalc package. This remarkable software product (IA May 80 and Mar 81) is regarded by many as the most significant development in microcomputing since the development of the microprocessor chip. The program has been translated to run in HP-83/85 machine language, and a set of new graphics programs add a new dimension.

VisiCalc Plus is only Hewlett-Packard's opening shot on the small business computing marketplace, but it's hardly the whole arsenal. The company will follow up with an information management package to join others in the stocks and bonds, securities, budgeting, finance and real estate fields. Some are supplied as Basic programs published in book form—you have to enter them into the computer yourself. Other application software centers around programming tools to allow the easy use of the available graphics and plotting accessories.

Computers that are designed to be portable are often a headache to service, since the components tend to be jammed together inside a small housing. The HP-83A is different. As small as the unit is externally, the inside remains but half full, since the space utilized by the HP-85's printing and cassette mechanism is vacant.

Look inside and you see the small CRT flanked by a pair of circuit boards containing the system's power supply and display circuitry. The keyboard swings away to reveal a circuit board containing the bulk of the computing and memory electronics. Most of the processing and support chips are custom designed, thus quite different internally from other microcomputers.

The final circuit card is a tiny mother board at the rear that accepts a variety of external plug-in modules that enhance the capabilities of the computer. Thus, there is no need to expose the innards of the unit just



HP-83 keyboard

to plug in additional memory, for example. A variety of modules are available; and, in the HP-83A, necessary to connect the computer to external peripherals. First is the IEEE-488 interface module. IEEE-488 is a document that describes the electrical interface between computers and their peripherals. It was initially designed as the HP-IB, and intended to allow a flexible connection to scientific instrumentation and process control devices.

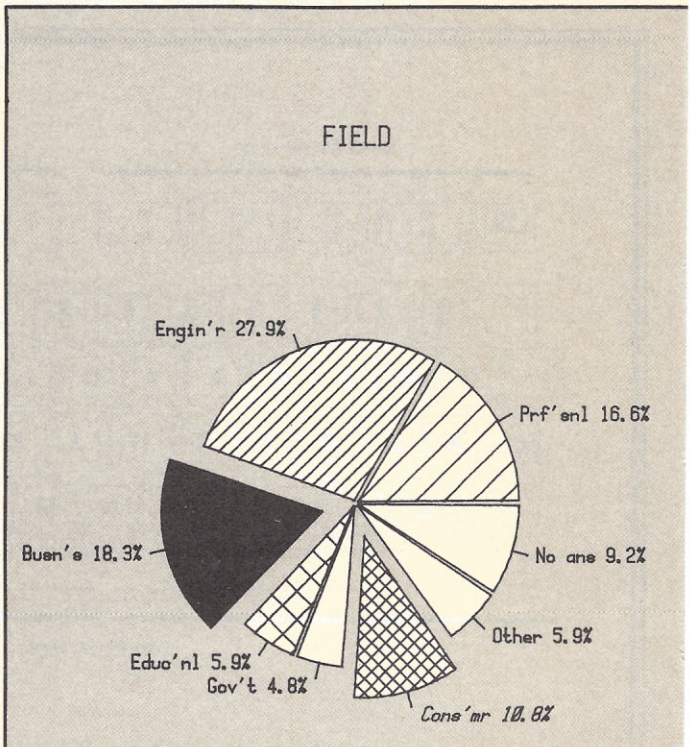
This interface performs all the functions of the more familiar EIA RS-232C, and many more. The HP-83A uses it to connect to external disk drives, printers, plotters, graphic pads and a host of other items.

Another useful plug-in device is a 16K memory module, to bring the capacity up to 32K bytes of user-accessible RAM. The additional memory is necessary to operate VisiCalc, as well as many other applications programs. It's false economy to be miserly with memory; it only makes the programming effort tougher, and programming time is expensive.

Software support growing

One of the plug-in modules is a sort of second-level mother board. The ROM drawer is mostly empty, but has space for six read-only memory chips. These ROMs contain systems-level programs such as a disk operating system, printer/plotter interface and assembly language programming package. This list of available software of this sort is growing rapidly.

The keyboard is a full-sized, full-stroke design incorporating 52 keys, including a calculator-style keypad on the right. Several special function keys are incorporated, including four that can be assigned meanings by the applications program being executed. A mechanical contact style keyboard is utilized, the least expensive of the available technologies. We have had contact



Sample pie chart printout

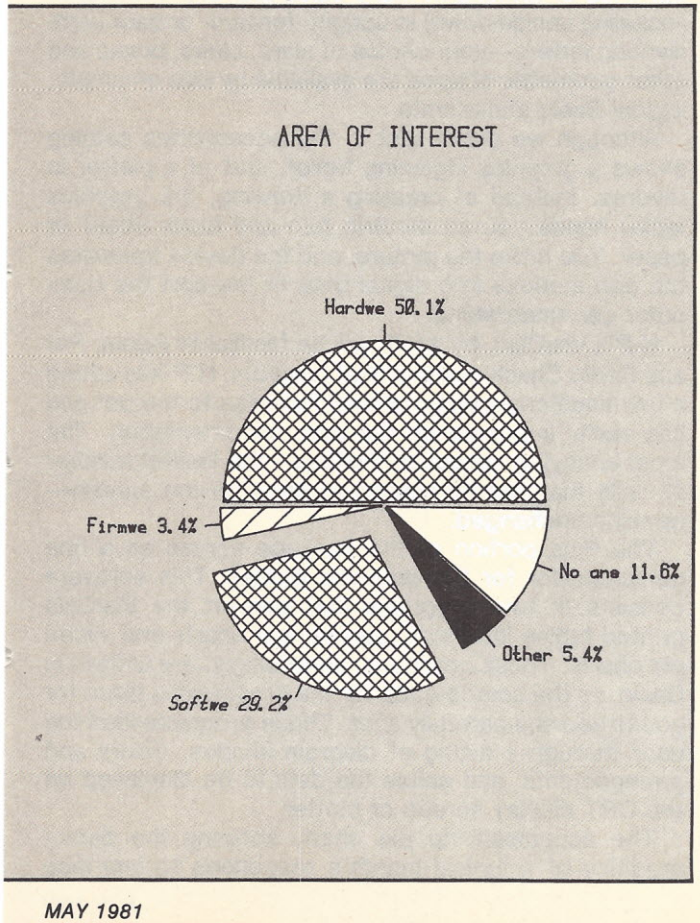
bounce difficulties with an identical key design on Soroc CRT terminals, but our experience with the HP-83/85 family has been, happily, bounce-free.

The *HP-83A Owner's Manual and Programming Guide* is a beautifully executed book devoted largely to the art of Basic programming. The illustrated examples not only lead you through standard Basic operations, but the special capabilities of the HP-83A as well. Such enhancements are rich indeed. The Basic includes 11 commands, 77 statement types (including 16 graphics ones) and 42 pre-defined functions. To this, add 31 statements when a floppy disk drive is connected, even more with the addition of a plotter or digitizing pad.

Good-bye re-typing

The Basic interpreter includes the PRINT USING facility so necessary in business programming. Programs can be edited directly on the screen, eliminating the necessity for re-typing each statement line that needs to be changed. This editing facility is much like that of the IBM 5100/5110/5120 family, and is one of the nicer aspects of working with the machine. HP-83A Basic performed our Prime Number Cruncher benchmark program (IA Jun 79 and Apr 81) in 1,243 seconds, placing it near the middle of the performance range of other 8-bit microcomputers.

Both 5¼-in. and full-size 8-in. floppy diskette drives are available. The first pair of each is included in an external cabinet, which seems to fit naturally underneath the main computer housing. The third and/or fourth ones require a second, similar enclosure. (Single-drive housings are also available, but this arrangement presents such severe operational difficulties that we would advise against it.) All floppy disk drives are double-density, double-sided units. A 5¼-in. diskette will hold 270K bytes of data; an 8-in. one, 1.2M bytes.



Total capacity, then, can range upwards to nearly 5 megabytes on line at any one time.

The company has carried a fast, 180 character-per-second (cps) serial dot matrix printer in its catalog for some time. For the HP-83A, a more appropriate choice would be a new 80 cps unit at about one-fourth the price. This is a printer manufactured by Epson—the same one that is becoming popular with home computerists in ever-increasing numbers. H-P modifies the Epson device with the addition of an IEEE-488 interface and sells it behind an official H-P nameplate at a surprisingly modest price.

The star of the system's peripherals line is the X-Y graphics plotter. This is a true instrument-quality unit. It will plot at up to 14 in. per second over a full 8½-in. by 11-in. page size, in steps nearly a thousandth of an inch small. It features an electrostatic paper hold-down mechanism, and allows the insertion of inexpensive fiber-tipped pens in four colors.

The plotter is itself microprocessor equipped, and many of the programmer's chores are taken care of by

The star of the system's peripherals line is the X-Y graphics plotter—a true instrument quality unit

this dedicated CPU. The plotter will, for example, spell out lines of printing in many sizes and any orientation (including upside-down) in upright, forward- or backward-slanting letters—your choice of slant. Lines, boxes and other geometric shapes are available by use of simple, logical Basic statements.

Although we didn't test it, the accessories catalog shows a graphics digitizing tablet, sort of a plotter in reverse. Instead of creating a drawing, the graphics tablet hands you an electric pen and blank sheet of paper. You make the picture, and the device translates the pen motions into digital data of the sort the computer can understand.

H-P's VisiCalc, by itself, will be familiar to Apple, Pet and Radio Shack users of that program. H-P has added a few additional computational formulas to the pot and has vastly improved on the user documentation. The most annoying aspect of VisiCalc—the limited number of cells that can be viewed at once on the screen—remains unchanged.

The Plus portion of the package serves as a fine demonstrator for the graphics plotter. This software consists of four programs that convert the VisiCalc printed tables into lines, curves, bar charts and sliced pie charts. These programs, surprisingly, are written in Basic, so the source code for the programs is there for you to see and carefully alter. These programs lead the user through a dialog of diagram shapes, colors and arrangements, and cause the data to be displayed on the CRT display screen or plotter.

The accompanying pie chart, showing the demographics of a typical month's responses to *Interface*

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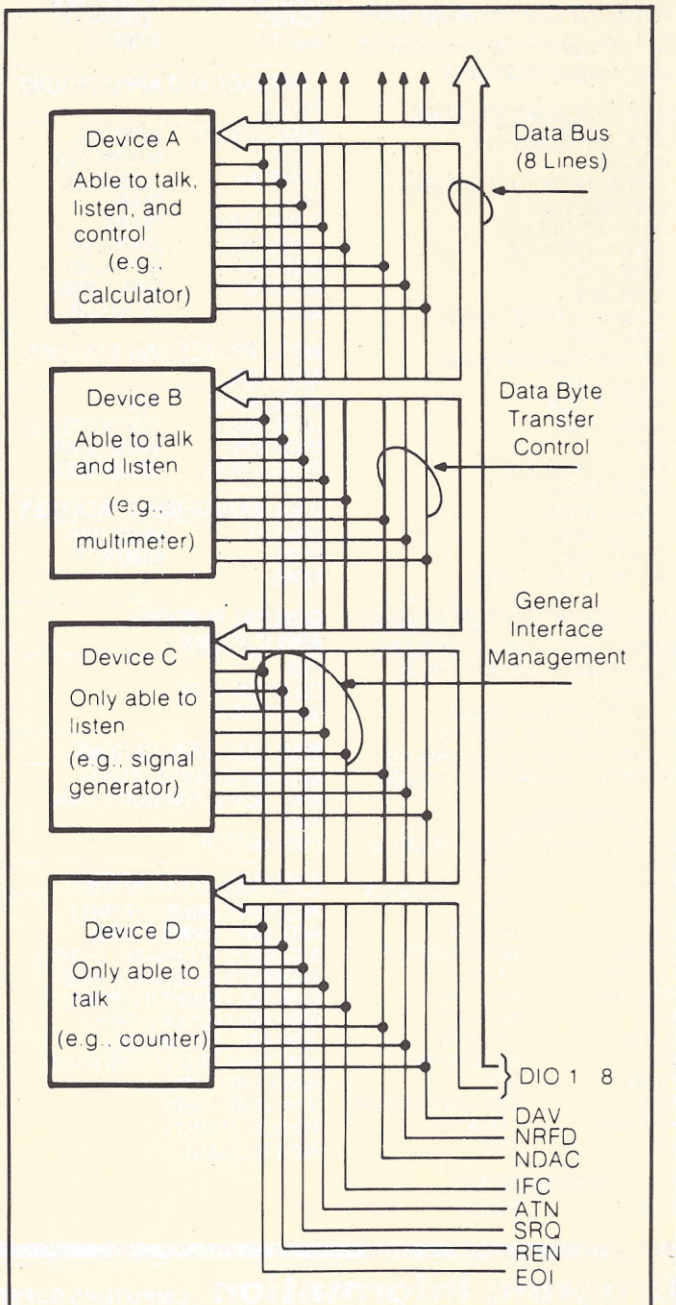
Pricing an HP-83A is a complex exercise, a task somewhat aided by the manufacturer's configuration guide. Although the basic unit lists for $2,250, it costs an additional $3,085 to fit a pair of 5¼-in. floppy disk drives once the necessary interfaces and firmware are added. Figure on $295 to bring the usable memory up to 32K bytes. The smallest printer is in the $1,000 range, and the X-Y plotter costs $2,200. Most of the applications software is $95 a pack, except for VisiCalc Plus for $200. □



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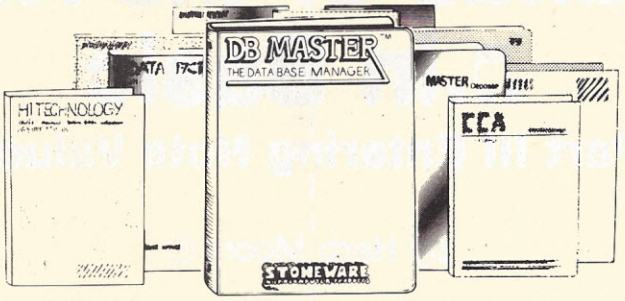

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Up to 9 lines for each record	YES	
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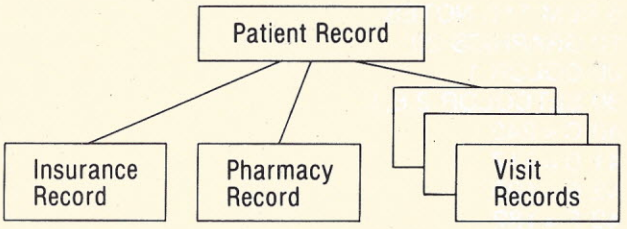

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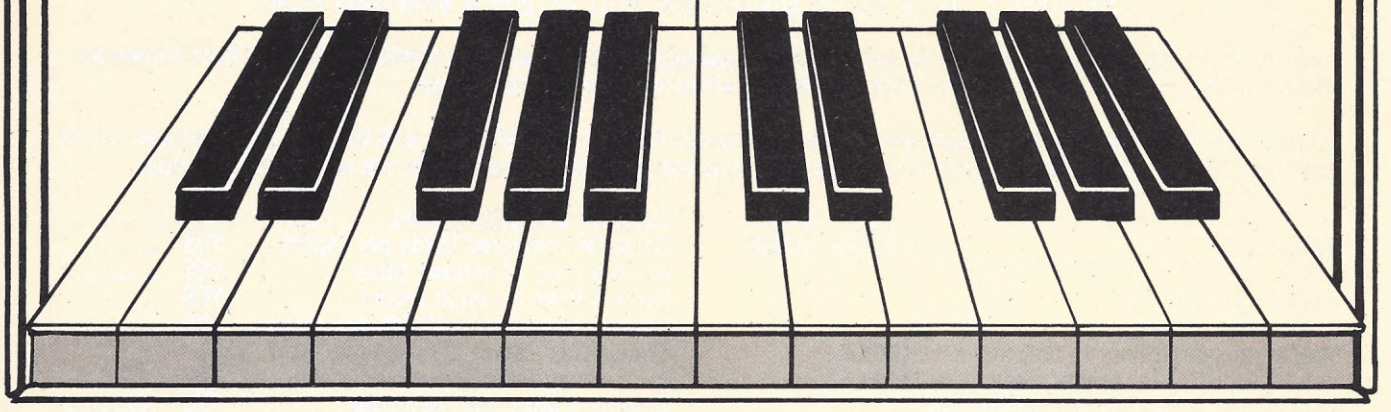
Sounds of the Atari ♫.in Basic

Part III Entering Note Values

by Herb Moore©



The first two articles in this series were devoted to learning some essential programming tools in Basic, as well as some of the sound and graphics commands for the Atari computer. This installment will look at a way to conveniently enter note values and use the sound parameters to further refine the notes that are played.

To begin with, look at the following listing:

```
5 REM **C NOTES
10 GRAPHICS 20
20 COLOR 1
30 SETCOLOR 2,8,1
40 C=242
41 D=217
42 E=193
43 F=182
44 G=162
45 A=144
46 B=128
50 C1=121
51 D1=108
52 E1=96
53 F1=91
54 G1=81
55 A1=72
56 B1=64
60 C2=60
61 D2=53
62 E2=47
63 F2=45
64 G2=40
65 A2=35
66 B2=31
70 C3=29
800 PLOT X,Y
900 REM **1ST VOICE
910 FOR L=15 TO 0 STEP -1
920 SOUND 0,N0,10,L
930 NEXT L
940 RETURN
950 REM ** 2ND VOICE
960 FOR L=15 TO 0 STEP -3
970 SOUND 1,N1,10,L
980 NEXT L
990 RETURN
```

If you study this carefully, or if you enter the information and try to run it, you will discover that it won't run. You'll get an error message. What this provides is a skeleton of a program that will easily allow for the entry of different note values for a three octave range of the notes in the key of C Major. Line 800 allows for entry of data to plot a point anytime we wish. The subroutines in lines 900 to 940 to 990 play whatever note is entered for the first or second voice.

Before beginning to enter data, a further explanation of the program is in order. Don't let line 10 throw you. It's essentially GRAPHICS 4 without a text window. By adding 16 to any of the graphics modes from 3 to 7, you obtain a graphics mode with the same number of columns and rows, but you eliminate the text window.

Lines 20 and 30 give you the color, hue and luminance. In your SETCOLOR command for black and white use the highest luminance (i.e. 14). This will give the greatest contrast of white points and lines against a black background.

So for you line 30 would be:

```
30 SETCOLOR 2,8,14
```

Lines 40-70 convert the numeric values for each of the notes into the letter value for that note, so that in

creating melodies you simply enter the note you want. For example, C1 is one octave above the lowest C available and C2 is two octaves above it.

The FOR-NEXT loop appearing in lines 910-930 need a bit of explanation. This is telling the machine to play the note at its highest value for loudness (i.e. L = 15) and then play it at L = 14 and so on to L = 0, which is of course, inaudible. This is happening extremely fast so that you don't hear the note played 16 times at different levels of loudness. What happens is that your ear hears a single tone with a certain decay rate. The decay of a note is a very important concept in the psychophysics of music. It is one of the factors that helps your ear to distinguish between the sound of a piano or a guitar playing the same note.

At line 960-980 we have a similar loop, but the STEP –3 is causing the machine to count down by 3's, thus the decay of the note will be slightly faster. To illustrate the difference in the decay rate for the two different voices, let's play a scale with one voice and then the other. To do this add these lines to the program:

```
100 N0 = C1 : GOSUB 900
105 N0 = D1 : GOSUB 900
110 N0 = E1 : GOSUB 900
115 N0 = F1 : GOSUB 900
120 N0 = G1 : GOSUB 900
125 N0 = A1 : GOSUB 900
130 N0 = B1 : GOSUB 900
135 N0 = C2 : GOSUB 900
200 N1 = C1 : GOSUB 950
205 N1 = D1 : GOSUB 950
210 N1 = E1 : GOSUB 950
215 N1 = F1 : GOSUB 950
220 N1 = G1 : GOSUB 950
225 N1 = A1 : GOSUB 950
230 N1 = B1 : GOSUB 950
235 N1 = C2 : GOSUB 950
```

Since lines 100-135 and lines 200-235 are quite similar, there's a way to avoid a lot of typing when entering lines 200-235. First, hold down the shift key and then use one of the keys with the arrows on the right of your keyboard to move the cursor (the little white square) in the direction you want to go. In this case it goes up to line 100. Now type the new line number (i.e. 200) over the other one. (Only the line number—not the whole line.) Then hit RETURN. When you list the program, you'll see that you have both lines 100 and 200. You can use this method to repeat lines 100-135 as lines 200-235 and then change the N0 to N1 and the GOSUB 900 to GOSUB 950 in each line.

You can now run the program and hear the scale with two different decay rates. You will also notice that the second scale is played much faster than the first. This is to be expected, since the decay loop in the second scale is counting faster than in the first. In order to make the duration approximately equal in each of the two scales, you can enter:

```
985 FOR T = 1 TO 50 : NEXT T
```

This will create a slight pause after each note is played.

We can use the graphics to further delineate one scale from another by adding these lines to the program:

```
925 X = 125 – N0 : Y = 40 – X/2
```

```
926 PLOT X,Y
955 COLOR 2
972 X = 125 - N1 : Y = 40 - X/2
973 PLOT X,Y
```

Lines 925 and 926 tell the machine to plot points for each of the values of N0 entered starting in the lower left hand corner of the screen and moving towards the upper right hand corner. Graphics mode 20 (or mode 4) has a slightly higher resolution than mode 3 used in the last article. It has 80 columns and 40 rows. You will also recall that the columns and rows are numbered from 0 across and down in starting in the upper left corner of the screen, while the numeric values for each note is inversely related to the pitch of that note.

Since the scale we are playing has numeric values between 121 and 60 for N0, line 925 will plot points with increasing column numbers and decreasing row numbers, which is what we need. If you don't get it at first, ponder it some.

What COLOR 2 in line 955 combined with lines 972 and 973 does, is to plot the points again in the same color as the background screen, thus effectively erasing the dots.

The actual result that can be expected from the program is that it will play a C Major scale twice, with a different decay each time. The first, with a slower decay, plots points on the screen; the second scale, with faster decay erases them.

Now that you understand the decay of a note, what about how it begins? This is called the attack of the note. The piano, for example, has a much more percussive attack than the violin. In order to hear what the scale sounds like with different rates of attack on the notes, change lines 910 and 960 to:

```
910 L = 0 TO 15
960 L =0 TO 15 STEP 3
```

and add

```
935 SOUND 0,0,0,0
986 SOUND 1,0,0,0
```

In line 910, you don't need the STEP function when counting up by 1's. When you are working with the decay of the notes (L = 15 TO 0) you ultimately turned the tone off when the machine got to L = 0. But when working with the attack, that's not the case. The last note of the scale for each voice will stay on unless you turn it off. Lines 935 and 986 will turn off a given voice before the scale played on the other voice begins.

So far, you've just been playing the scales, but this structure allows you to enter a variety of note values so you can create your own melodies. If you want to present yourself with some further options, make lines 910 and 960 decay loops again, and add the following two subroutines:

```
1000 REM ** 1ST VOICE
1010 FOR L=0 TO 15
1020 SOUND 0,N0,10,L
1030 X = 125 - N0 : Y = 40 - X/2
1040 PLOT X,Y
1050 NEXT L
1060 SOUND 0,0,0,0
1070 RETURN
2000 COLOR 2
2010 FOR L=0 TO 15 STEP 3
2020 SOUND 1,N1,10,L
2030 X = 125 - N1 : Y = 40 - X/2
2040 PLOT X,Y
2050 NEXT L
2060 FOR T = 1 TO 50 : NEXT T
2070 SOUND 1,0,0,0
2080 RETURN
```

Now you have the option of playing a note with either one of two different rates of decay or attack. Be sure that the notes entered for voice 0 go to subroutine 1000, while voice 1 goes to 2000. Here's an example of some variations of attack and decay rate for two times through the scale.

```
100 N0 = C1 : GOSUB 900
105 N0 = D1 : GOSUB 900
110 N0 = E1 : GOSUB 1000
115 N0 = F1 : GOSUB 900
120 N0 = G1 : GOSUB 1000
125 N0 = A1 : GOSUB 900
130 N0 = B1 : GOSUB 900
135 N0 = C2 : GOSUB 1000
200 N1 = C1 : GOSUB 950
205 N1 = D1 : GOSUB 2000
210 N1 = E1 : GOSUB 950
215 N1 = F1 : GOSUB 2000
220 N1 = G1 : GOSUB 950
225 N1 = A1 : GOSUB 950
230 N1 = B1 : GOSUB 2000
235 N1 = C2 : GOSUB 950
```

As a final possibility for variation in the shape of notes in your program, here's a subroutine which will affect both the attack and decay of a single note being played. As you can see by looking at lines 3010, 3040, 3050 and 4010 through 4030, it will also cause a dot to appear and then disappear on the screen for each note played.

```
3000 REM **ATTACK AND DECAY BOTH
3010 COLOR 1
3020 FOR L = 0 TO 15 STEP 5
3030 SOUND 2,N2,10,L
3040 X = 125 - N2 : Y = 40 - X/2
3050 PLOT X,Y
3070 NEXT L
3090 FOR L = 15 TO 0 STEP -3
4000 SOUND 2,N2,10,L
4010 COLOR 2
4020 X = 125 - N2 : Y = 40 - X/2
4030 PLOT X,Y
4040 NEXT L
4050 RETURN
```

If you want to enter note values other than in the octave between C1 and C2, you're going to have to make some changes in lines 925, 972, 1030 and 2030. The range of the points plotted is going to be affected by the value of N0 and N1, so you may find yourself getting an ERROR 141 (cursor out of range) message. To account for this, the statement for the values of X and Y should take this form:

```
X = 88 - N0/3:Y = 40 - X/2
```

You should now be able to find numerous ways to affect the shape of any given note to be played by your Atari. □

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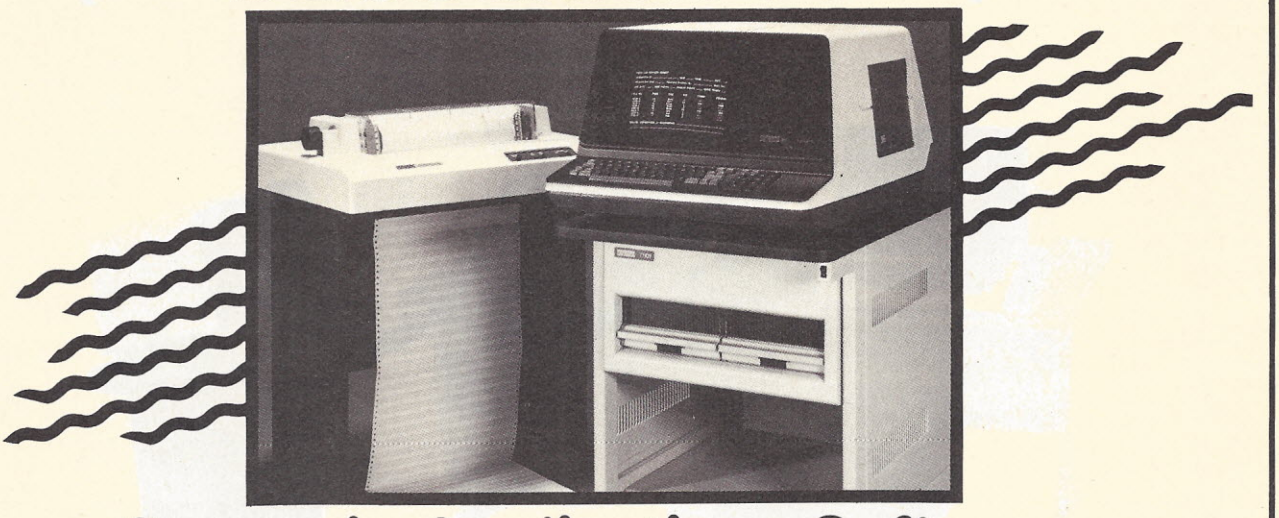
Assignment: Benchmark

DECstation 78 —



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	C-3 Accounts Receivable Time	Current Price
DECstation 78	5:04.8*	$10,495
Vector Graphic System B	5:56.5	$ 8,995
Texas Instruments Model 771	3:38.1	$12,100
North Star Horizon	1:57.7	$ 6,911
Cromemco System Two	2:48.0	$ 9,275
Pertec PCC 2000		
Radio Shack TRS-80 Model II	*to be covered in future issues*	
Apple II Plus		
Digital Micro Systems DSC-2		

*Includes both compile and run time

by Hillel Segal

In the evaluation of computer systems, software and after-sale support rank just as high as speed and suitability of hardware. The Digital Equipment Corporation's DECstation 78 turned in a mediocre performance in speed tests, yet scored highly with users surveyed. Their impressions reveal a strong appreciation for the business software and maintenance support that came with the system.

The benchmark testing process, conducted for the Association of Computer Users by the Business Research Division of the University of Colorado, is designed to compare the relative performance of similarly-priced computers when running identical applications. Some tests are designed to measure the speed of specific portions of the computer, such as the CPU or diskette drives. Others are written to simulate a common type of program that might be used within a scientific or business environment.

While most systems have been tested in Basic, manufacturers may choose another language if desired, with the exception of Assembler. (Assembly languages are not allowed due to the inherent speed difference between them and high-level languages.)

The 78 was tested using a semi-compiled version of Basic. The benchmark timings for it include both a short compile step and the run time for the program. In practice, the compilation can be performed separately, if desired, in order to shorten the system's time in performing a frequently-used application.

While the times recorded during benchmark testing may be used to compare the sheer speed of computers, many other factors are important in evaluating and selecting a system. Among these factors are the languages offered, the packaged software available, the necessary amount of system memory and disk storage, and printer and communications options. In

addition, users must evaluate the supplier as carefully as the system itself, since support during and after installation can be crucial to success.

These less tangible factors are also covered in sections of ACU's reports. A survey of users is conducted along with the testing process to uncover positive and negative features of each computer as they appear to the end user.

Most of the benchmark times for the 78 were in the bottom half of the 12-system field. Its showing in the accounts receivable problem was about average for the group, however, and the system did very well on one of the CPU-intensive comparisons.

Company officials stress that the 78 is not intended to be the fastest on the market. Its strong points, they said, are ease of use and good applications programming. Most users did not comment on the system's speed negatively, although one pointed out that "searching time is slow and sort programs take a long time to execute."

The system tested included a processor, 16K words of memory (each 12 bits in length), a video terminal, two double-density disk drives and an LA 120 printer. A similar configuration (including operating systems for Basic, Fortran and Dibol, word processing and list processing software and a small desk) was recently quoted by a DEC computer store at $10,495.

Much of the price tag, however, is for software items that are now optional. For instance, the same hardware configuration with only the Basic and Fortran languages and no desk would sell for $7,695.

Note that these prices are at the store, not direct from the company. It seems that the stores are selling this system exclusively—in complete packaged versions that generally do both word processing and accounting functions.

Digital Equipment has a large line of small and medium-sized computers, with and without business software. However, it normally sells to OEMs who tailor programs and support to the customer's needs. Single-quantity prices tend to be higher than those from the computer stores; since OEMs buy in quantity and generally add value to the system after purchase, it is difficult to compare precisely.

Business packages available

The manufacturer offers application packages for accounts payable and receivable, invoicing and inventory, general ledger, and payroll as well as word processing. OEMs may offer either identical or modified versions of these programs, or may supply custom software. When bought from an OEM, the system is usually purchased on a turnkey basis by customers interested in a specific application rather than a general-purpose computer. Less than one-third of those surveyed were doing any in-house programming.

A pleasant surprise was the lack of criticism directed at the dealer. There were few complaints about software or support from the OEM or its representative. "The OEM is super and they work with us in every way...very cooperative," commented one user. This contrasts with interviews about several of the other computers ACU has studied. Support from the dealer can become a sore point, either from the standpoint of programming or hardware repair. In some cases, training programs come under criticism as well.

While some of the 78 users had experienced hardware problems of one kind or another, they praised the service provided by DEC. Most often they mentioned disk drive problems, but indicated the trouble had been satisfactorily resolved.

Users who were not programming generally had applications that were written in Dibol, a DEC language. Dibol operates under the COS-310 operating system; a separate system, OS/78, is provided for use with the Basic and Fortran languages.

A sophisticated editor with global search-and-replace and block insert/delete capabilities is included with the OS/78 operating system. Also provided are utilities such as disk-packing routines to cut down on wasted storage space, a line-by-line comparison feature, and special commands to set margins for the printer and terminal and determine the character set to be used. Program execution can be traced using a feature that reports the order in which each program step is executed.

An idiosyncratic quirk

ACU's consultants agreed with customers that the system is very easy to use. Both the operating system and the applications packages are menu-driven to guide the user through each step.

One difficulty encountered during the benchmarking process came from an idiosyncracy in the Basic compiler. While it is common for statements concerning file manipulation or which reference output devices to vary from version to version, the DEC Basic added a new kink. It requires arithmetic to be positioned on a report output to be defined as a string variable, and also stipulates that constants placed in the source code have quotes around them. As a result, numerous modifications to the programs were necessary.

Another unusual aspect of the system—but one which presented no difficulties—is the memory structure used in the processor. Each word is made up of two 6-bit bytes of data. The 12-bit word length enables arithmetic calculation to 16-digit accuracy rather than the more commonly-found 6-digit accuracy of many Basic systems. In addition, the two-instruction fetches made possible by this arrangement help speed up processing. However, some users commented that the 32K byte memory capacity places restrictions on usage.

Recent decreases in the price of hardware coupled with unbundling of the software, make the system more attractive in price. Together with the application software from the company or an OEM, this is an attractive computer to consider for use in a small business or at the departmental level within a larger firm. □

CIRCLE INQUIRY NO. 151

Hillel Segal is president of the Association of Computer Users, a non-profit association with members all over the U.S., Canada and several other foreign countries.

One of the association's key activities is the publication of its Benchmark Reports. Each month a new report is produced covering a computer system.

In addition, ACU publishes seven bimonthly newsletters for users of small computers, midi computers, large computers, time-sharing systems, distributed processing systems, word processing systems and home and hobbyist computers.

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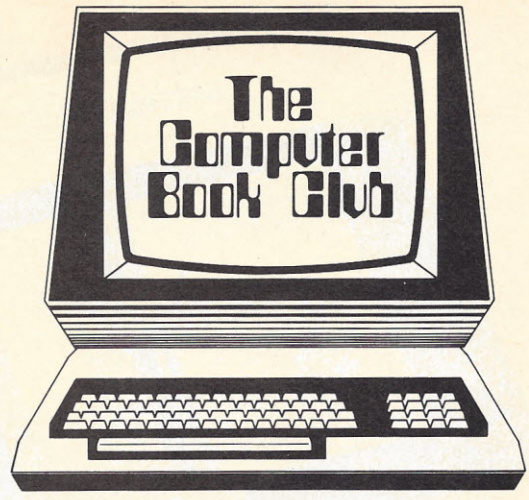

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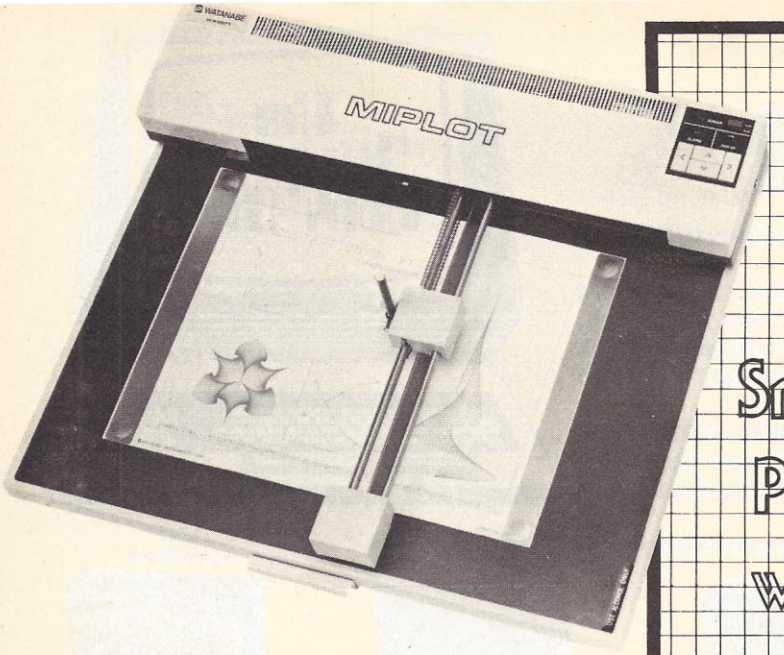


Hardware Evaluation

Smart Plotter Eases Program Drudgery

Watanabe's Miplot Plotter

by Roger H. Edelson

The Miplot plotter, model WX4671, from Watanabe Instruments Corp. (distributed by Astar International, Chino, CA) provides only average mechanical performance, but it is the addition of intelligence that sets it apart from similar devices. This intelligence manifests itself in the ease with which plots can be generated. Only single Ascii characters are needed as commands to the plotter either for drawing straight lines or for printing characters.

When plotting, either solid or broken lines can be specified; and when the broken line option is selected, another single Ascii character is all that is required to specify the pitch of the broken lines. In addition, the unit will draw coordinate axes by simply specifying the graduation interval and the number of repetitions. It is this simple method of transmitting plotting commands that makes this plotter particularly easy to interface. To add to its versatility, the plotter responds to four single letter character commands that allow the programmer to easily change the character size and orientation.

The mechanical performance is only average, providing a maximum plotting speed of just 50 mm/sec

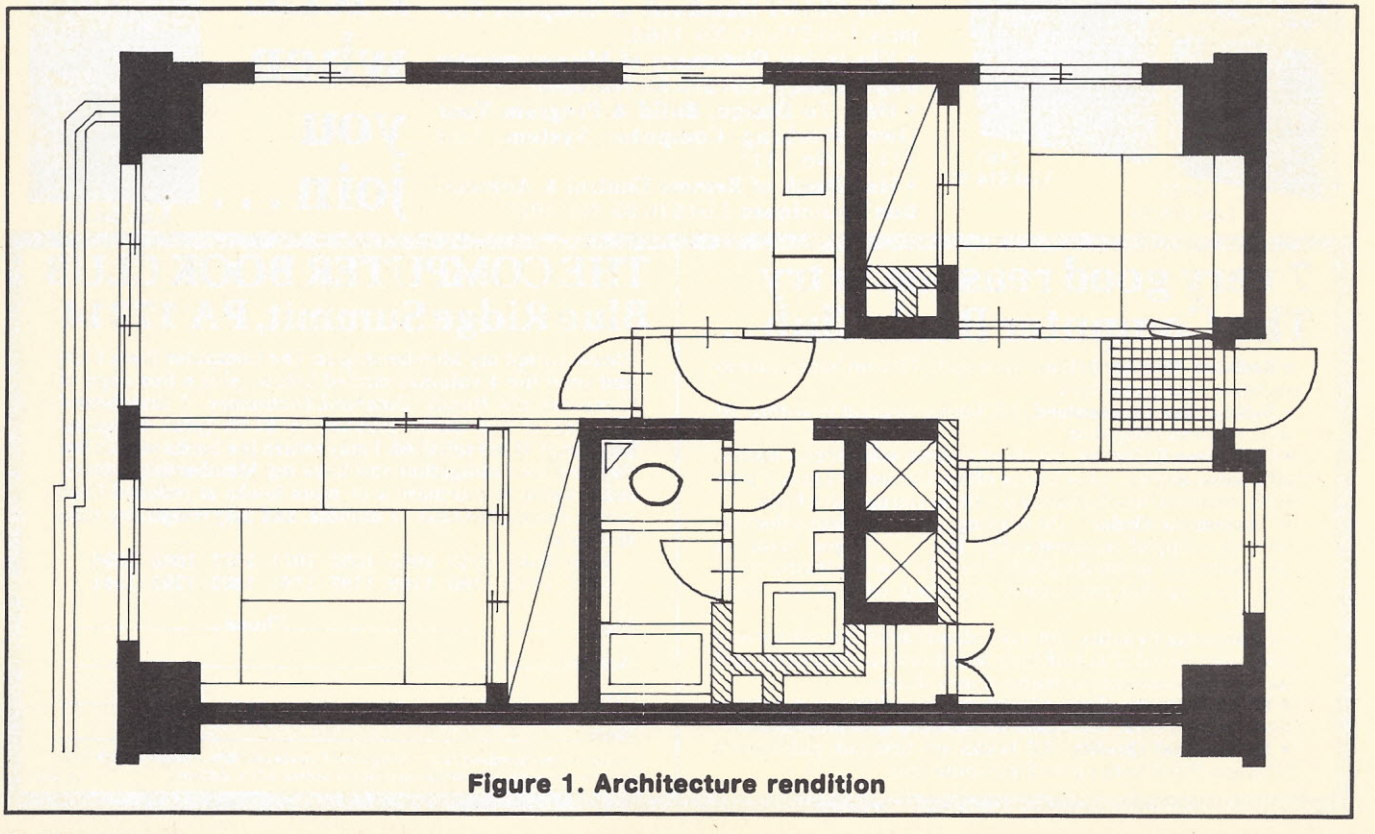


Figure 1. Architecture rendition

(about 2 in/sec) and its sounds somewhat like a berserk tank as it grinds along. I can't quite figure out why it should be so noisy, as it uses nicely designed plastic drive chains to move the pen both horizontally and vertically. The plotting accuracy is within 1% of the specified vector distance and it will repeat a particular point within 0.3mm.

The somewhat comparable HP 7225A plotter will beat all of these specifications by factors of three or five at, unfortunately, about $1000 more. HP will generally not discount and the the Miplot is sold for $1045 from some stores. For the price, the performance is definitely more than acceptable.

The unit will plot on paper up to a maximum size of 300mm by 420mm (11 in. by 17 in.), though the maximum plotting area is limited to 260mm by 360mm. The instructions suggest the use of coated paper only (available from the distributors at $9.50 for 50 sheets

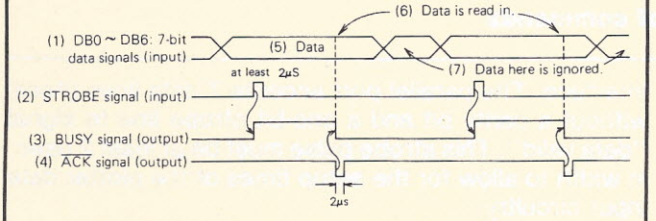


Figure 2. Input-output signal timing chart

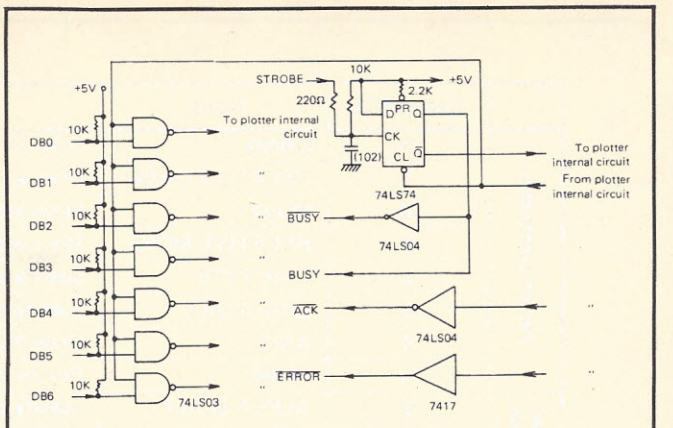


Figure 3. Interface Circuit

of the 17 by 11 size), but I had no problems also using regular bond. One major plus is the feature that allows the plotter to utilize any hard fiber-tip type pen, though the maximum weight is limited to 7g.—a figure you should find difficult to exceed. The plots achieved in both cases are excellent in appearance, if you can stand and wait—the drawing of the house, figure 1, took about 20 minutes with an Apple II as the host computer.

The overall functional and physical design of the plotter is quite good, and it appears that the unit will provide reliable service for many years. The slots along the top of the plotter are to allow convection movement of air to cool the internal circuitry. The paper hold-

	Code(ASCII)	Name	Function
Vector commands	D	DRAW	Draw a straight line to the point specified by absolute coordinates.
	I	RELATIVE DRAW	Draw a straight line to the point specified by relative coordinates.
	M	MOVE	Move with pen up to the point specified by absolute coordinates.
	R	RELATIVE MOVE	Move with pen up to the point specified by relative coordinates.
	L	LINE TYPE	Specify solid or broken line.
	B	LINE SCALE	Specify the pitch of a broken line (0.1 – 12.7mm).
	X	AXIS	Draw X or Y coordinate axis.
	H	HOME	Return to the origin with the pen up.
Character commands	S	ALPHA SCALE	Specify character size (1 to 16 times basic 0.7mm x 0.4mm)
	Q	ALPHA ROTATE	Specify character orientation. (Four directions)
	P	PRINT	Draw ASCII code characters.
	N	MARK	Draw mark centered on the pen position. (Six kinds)

Figure 4. Table of commands

down is simple, but quite effective. The designers use two thin steel paper retaining strips that are removed by pressing down on slightly raised disks at each end. When these areas are pressed, the strip reverses tension and no longer grips the plotting surface. It's simple, reliable and effective. Operating switches are provided to position the pen before plotting, raising and lowering it, and turning power on and off.

An indicator lamp is provided to indicate when the plotter is on; another signals either a command error or an off-scale condition of the pen. To insure user confidence the plotter is also provided with a self-test mode to automatically draw a complete test pattern. To complete this simple testing and maintenance philosophy, the control circuits and mechanical drives are built using a modular construction for ease of replacement.

Simple connection

This ease of use design philosophy is extended to the electronic portions of the plotter as well, by designing the interface around a standard 7-bit parallel input using Ascii characters. This makes the connection to most microcomputers very simple through the use of the printer output port. Apple II computers require the Apple parallel printer interface card (A2B0002X), which must be configured for a Centronics printer interface. The parallel port accepts 7 data lines (Ascii) without a parity bit and a one-bit strobe line to signal "data valid". This strobe pulse must be at least 2 usec. in width to allow for the setup times of the plotter data input circuitry.

The plotter provides four output signals: BUSY, BUSY*, ACK*, and ERROR* to complete the necessary handshaking protocols. The transmission of commands and data to the plotter is asynchronous with the plotter basically controlling the data output rate. The timing of these interfacing signals is shown in figure 2, which also shows the relationship between the BUSY signals and the ACK* line. The actual interface circuit design

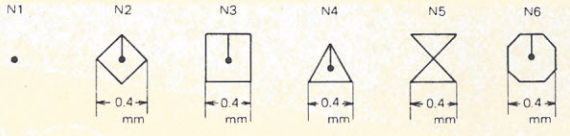
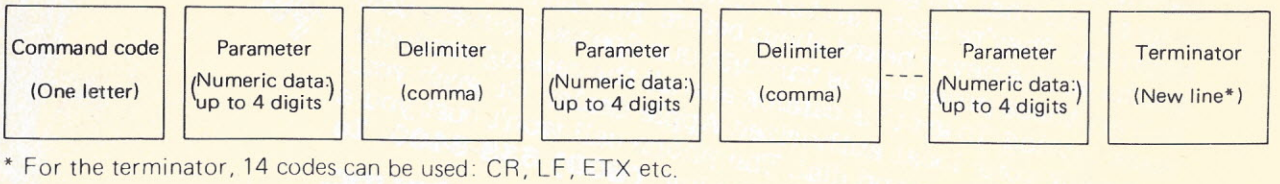


Figure 5. Plotter mark styles



* For the terminator, 14 codes can be used: CR, LF, ETX etc.

Figure 6. Command format

is shown in figure 3. Note that all the data input lines are buffered using 74LS03 IC's.

The table of single character commands is shown in figure 4. Besides the normal vector commands that allow the programmer to specify a point by absolute coordinates, the commands I and R allow the desired point to be specified relative to the previous position. This feature greatly eases programming requirements

Program listing (PW1)

```
10 REM *** PROGRAM NO.1 FOR WX4671 ***
20 PRINT
30 PRINT "PROGRAM NO.1 START"
40 GOSUB 9700
50 PRINT "STRING";
60 INPUT X$
70 PRINT "SIZE";
80 INPUT S
90 PRINT "POSITION";
100 INPUT XO,YO
110 IF XO>3600 GOTO 90
120 IF YO>2540 GOTO 90
130 X9$="S":Y=S:GOSUB 8000
140 X=XO:Y=YO:GOSUB 9100
150 GOSUB 9400
160 GOTO 40
8000
 ⎫
 ⎬  Basic subroutines
 ⎭
9990
```

Explanation

10	Program title
20	Blank line (CRT)
30	Initial display
40	Return pen to origin (Plotter reset)
50	Prompt for character string input
60	Input character string
70	Prompt for character size
80	Input character size to variable S
90	Prompt for plotting position
100	Input plotting position to variables X0 and Y0
110	Reinput if x coordinate exceeds 3600
120	Reinput if y coordinate exceeds 2540
130	Set character size
140	Move pen to plotting position
150	Draw character string
160	Repeat execution for a new string

Figure 7. Sample program and explanation

when drawing connected segments—the majority of all plotting. The character commands also ease the burden on the programmer, not only by providing a simple method of labeling plots, but by the simplicity with which the character size and orientation may be specified.

The ALPHA SCALE command, S, allows the character size to be specified as any integer multiple between 1 and 16 of the base value of 0.7mm by 0.4mm. Additionally, the MARK command, N, allows six different styles of plot to be drawn at the pen position. This feature makes it easy to produce professional appearing graphs where each graph must be positively identifiable; figure 5 illustrates these different marks. The overall command format is shown in figure 6, and a simple program to print character strings is given in figure 7. Figure 8 shows the result of running the character string program using Miplot as the input string.

Programming aid available

To illustrate the versatility of the plotter, a program was introduced which produces a plot of the projection of a three-dimensional space onto the two-dimensional plotting surface. To ease the programming burden still further, for $35 a program called Screen Dump is available, which plots copy of the high resolution display on an Apple II screen. This program allows the screen display to be plotted in any of 12 sizes with either inverse or normal plotting.

I found the plotter to be particularly trouble free and extremely useful in the production of graphs of experimental results and statistical/management charts. The simple command structure greatly eases the drudgery of converting results to plotter output. The unit seems particularly suitable for personal or small business applications requiring pictorial type outputs without a premium on speed. □

Keying in example

```
STRING?   : miplot
SIZE?     : 10  (characters 7.7mm high)
POSITION? : 100, 2500  (x = 10mm, y = 250mm)
```

Direction may be modified using the Alpha rotate command as above.

Figure 8. Character print

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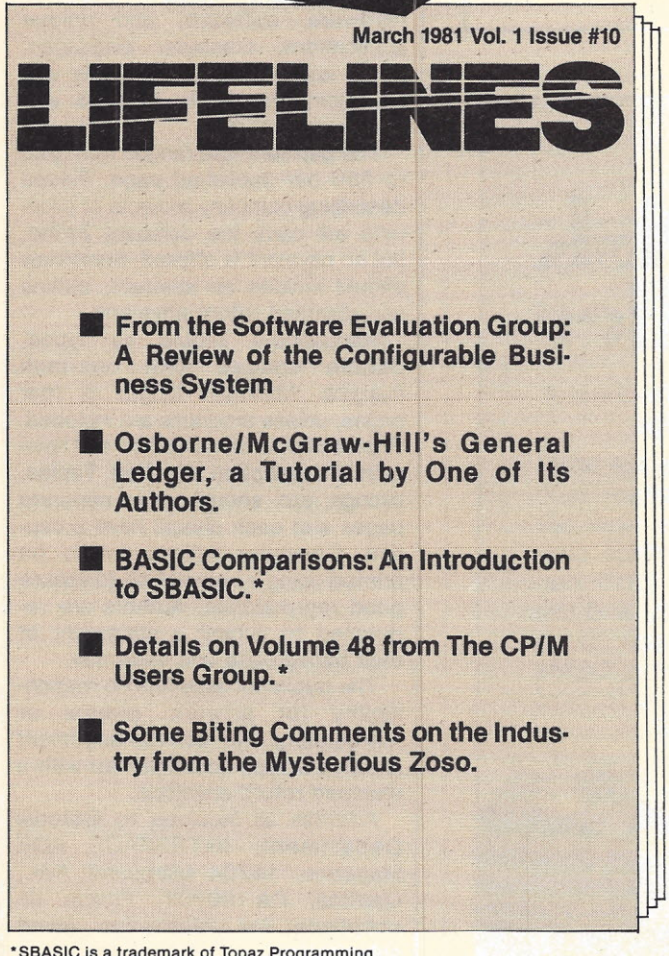

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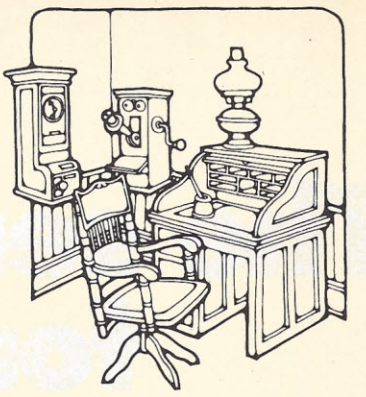

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The payment rate ranges from $20 to $50 per published page. Pieces describing company projects or products will carry the company byline, but no payment is offered. Submittals should include an abstract, outline and stamped return envelope.

Manuscripts should be typed, double spaced with one-inch margins. Minimum length is four pages, unless programs are included. Photos should be numbered and have a brief description attached. Tables, listings, etc. should be on separate pages and each should have a caption. Computer listings should be printed using a new ribbon to assure good reproduction. Authors are requested to submit a statement of their background and expertise.

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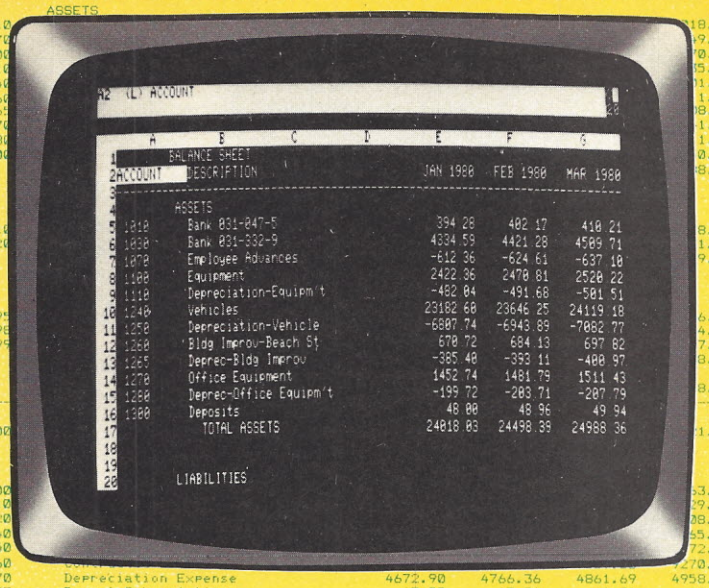

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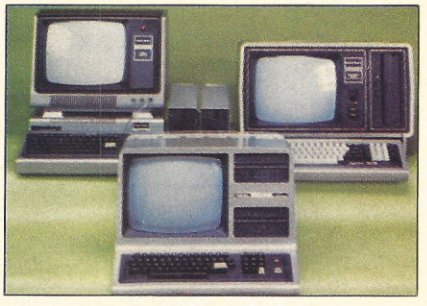

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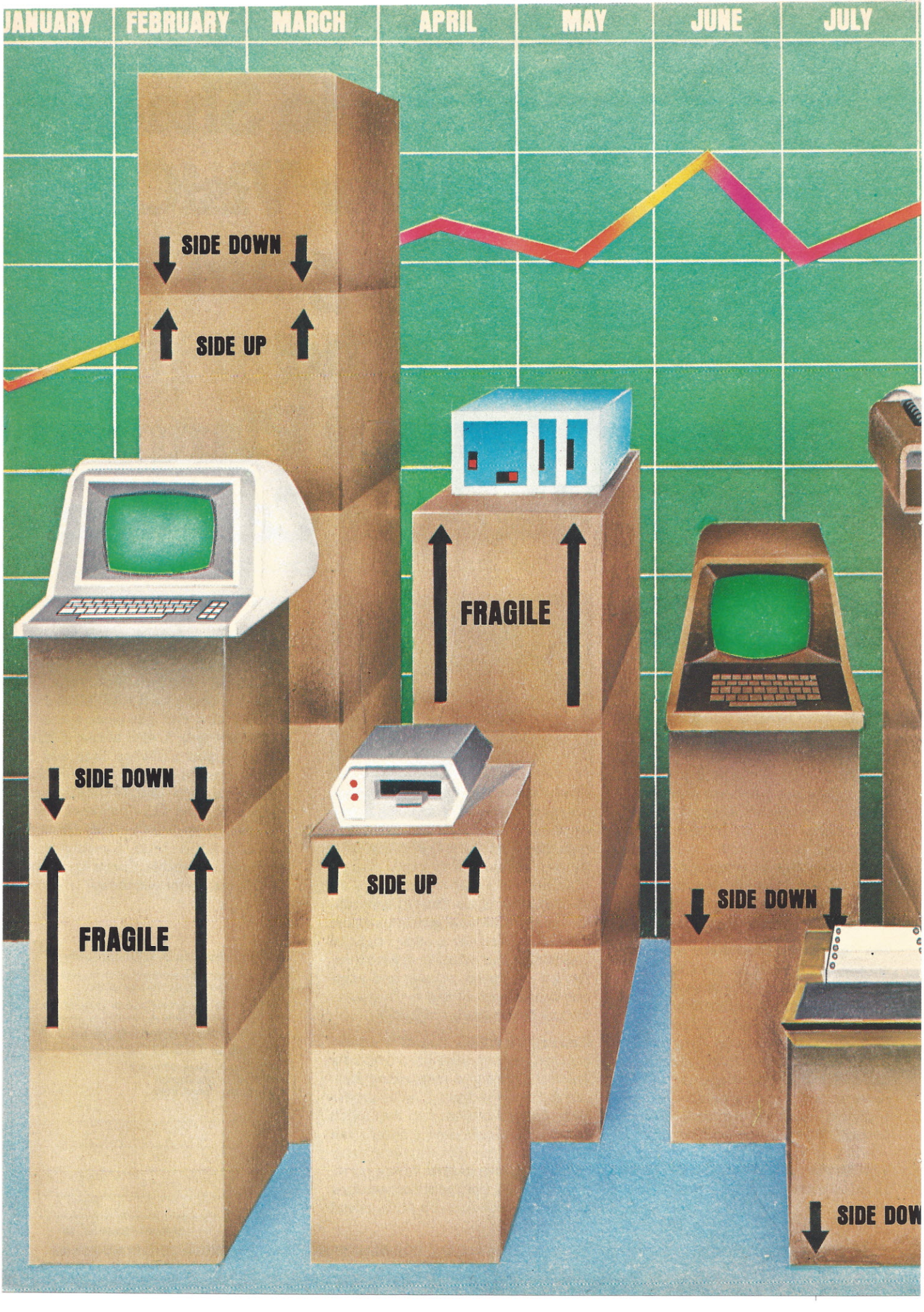
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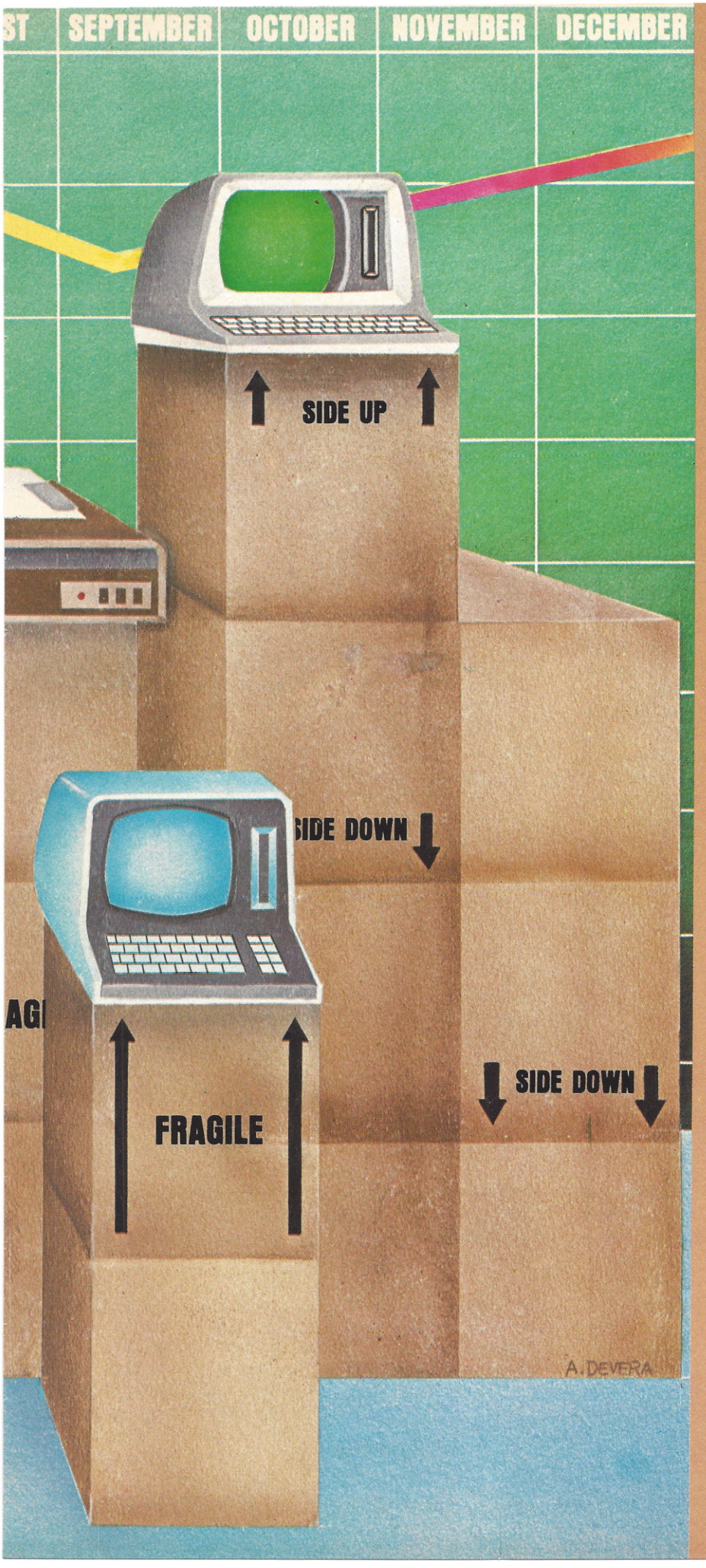


WHO'S SELLING WHAT

by Ray Vukcevich

Until you can afford that expensive data base system, here's one way to keep track of your sales activity. Timely data on salesman performance is often required for management decisions. These programs let you see at a glance who is selling how much of what. Retail/wholesale price differences are also included. The program Management Reports maintains a master file of sales data and two table files—one for salesman numbers and names and the other for product numbers, names, wholesale prices and retail prices. All files are easily updated, and a detail report, a summary report and an exception report may be produced. You can see just what your people are doing.

There are four programs chained together to save memory, but you can put them back together if you have room. Written in CBasic-2, the programs will be easy to convert to other Basics.

A main menu is first displayed:

```
Management Reports

Maintenance
   M - UPDATE MASTER FILE
   T - UPDATE TABLE FILES

Reports
   E - ERROR REPORT
   D - SALESMAN DETAIL REPORT
   S - SALESMAN SUMMARY REPORT

   Q - QUIT

   Task?
```

The E, D and S commands from the main menu all chain to the program Reports. Simply follow the prompts. You can display the reports on your CRT or have them printed. You will want to adjust the print format to suit your printer and your needs.

Error Report. Many errors are prevented as data is entered. But if

a salesman's number or item number is entered, which does not exist in the table files, the transaction record will be written to a file called ERROR.FIL. When the E function is used, a sales data exception report is produced. Records in error are listed and the total number given. Corrections can be made and the data reentered using the M function.

Salesman Detail Report. This is a day-to-day record of sales activity within a range of dates. The salesman's number, name and date are only listed once. Then item number, name, number of items sold, wholesale price, retail price and retail/wholesale price difference are listed for each transaction. A total line for each salesman is printed, and a grand total line for the period of the report is printed.

Salesman Summary Report. Within a range of dates, data is group printed for each salesman. Data is not broken down into individual transactions. This gives management a quick summary of the number of items sold, the total wholesale and retail prices and the total retail/wholesale difference for each salesman. A grand total line is printed at the end of the report.

When you begin, use the T (update table files) function to build your salesmen and product files. When you choose T, the program Tables is chained from the main menu program. You may choose S (salesman) or P (product). Enter the names and numbers of your salesmen; the program will produce a file called SALESPER.PAR. Enter numbers, names, wholesale and retail prices of your products; the program will produce a file called PRODUCT.PAR. These files are used in both the report program and in the editing routine of the master file update. If you want to change a record, add the new record, then delete the old one. All processing is batched, but when doing an add/delete, be sure to enter the add first, then enter the delete.

After you have built your table files, begin entering sales data with the M command. The program Upmast will be chained when you choose M, and you will be asked if you want the delete mode. If you answer YES (or Y), the items you list will be deleted rather than added to the master file. Data entry is the same for additions and deletions. It looks like this:

```
Date (YYMMDD)? 800925
    Salesperson number? A12
            Item number? A123
                Number? 123
            Item number? [RETURN]
    Salesperson number? [RETURN]
Date (YYMMDD)?  [RETURN]
```

Notice that you have only to enter the date one time until it changes. That is true for the salesman's number too. For example, if the date is September 25, 1980, enter 800925 for date. If the salesman's number is A12 enter it. After you enter all data for A12 on September 25, press return for item number, and the program will ask for the new salesman's number.

If you finish with September 25, press return, and the program will ask for a new date. If you press return for the date, the program will edit, sort and apply the transactions to the master file. There is no need to enter the salesman's name, the item name or the item prices; the program will pull that data from the table files.

Mistakes will be written to a file called ERROR.FIL. When Upmast is finished, a message ("Errors Written") will be displayed. You may then produce the error report if you wish.

Line numbers are necessary in CBasic only as labels for branching destinations—that is the places where GOTO and GOSUB statements send control. The line numbers on the extreme left in the listing were compiler-generated and not typed in when the program was written.

Notice %CHAIN in statement one of the Manage program. This is a compiler directive. The main program in a chained series must have a constant area, code size, data statement area and variable area of the same size or larger than any of the chained programs. Look at the end of each program for a list of these areas. The COMMON statement in line two of the Manage program tells the compiler which variables will be carried from program to program. Note that an identical statement appears in each of the chained programs. Leave both the %CHAIN and the COMMON statements out if you decide to merge these four programs into one.

Note the use of CHR$ in lines 8 through 11. CHR$(126) + CHR$(28) clears the screen and homes the cursor on the Hazeltine 1500. CHR$(126) + CHR$(31) causes the Hazeltine to display highlighted characters, and CHR$(126) + CHR$(25) returns the display to normal. Use your own terminal's codes.

CBasic allows long variables (FORM.FEED$ for example). You may need to make substitutions. Also note the use of \ in line 55. Backslash indicates to the CBasic compiler that the line is to be continued.

Three types of variables are used in the programs. F$ is an example of the type string. X% is of the type of integer, and NUM is of the type real. Be careful with subscripted variables. KEY$ and KEY$(X%) are different.

Editing in Upmast begins even as data is entered (see lines 20 through 25). The values of YEAR.1$ and YEAR.2$ are set in the Manage program (lines 13 and 14). Change these as needed. The values for SNUM.1$ and SNUM.2$ control the range of salesman's numbers, and the values for INUM.1$ and INUM.2$ control the range of item numbers. These are checked as data is entered in Upmast.

Data is checked against values in the table files SALESPER.PAR and PRODUCT.PAR in the editing routine beginning in CBasic line 110, compiler line 46, of Upmast.

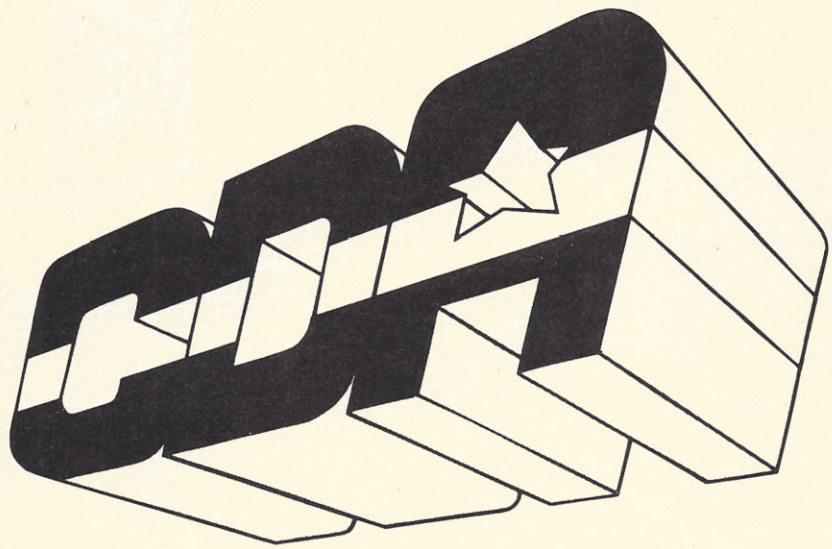
In both the Upmast and Tables programs, processing is by batch and is sequential. Values from the transaction array are compared to values from the master file. Only three results are possible. The master value may be greater than the transaction value; the master value may be less than the transaction value; or the two values may be equal. See CBasic lines 122 through 170 of Upmast. Because CBasic allows long variables, it should be easy to follow the logic of the sequential processing in these lines.

You may want other reports from the data. For example, reports by item rather than by salesman. Adding that capacity will take more space but should not be difficult. Determine the size of your master file. If you are using CBasic, use the SIZE function.

Depending on the size of the file, select an internal or external sort and sort the file in item sequence. Then simply use another routine such as those used here to produce the report. With a little work, you should be able to get just what you need. □

Program on page 146

"NOTHING IS MORE POWERFUL THAN AN IDEA WHOSE TIME HAS COME."



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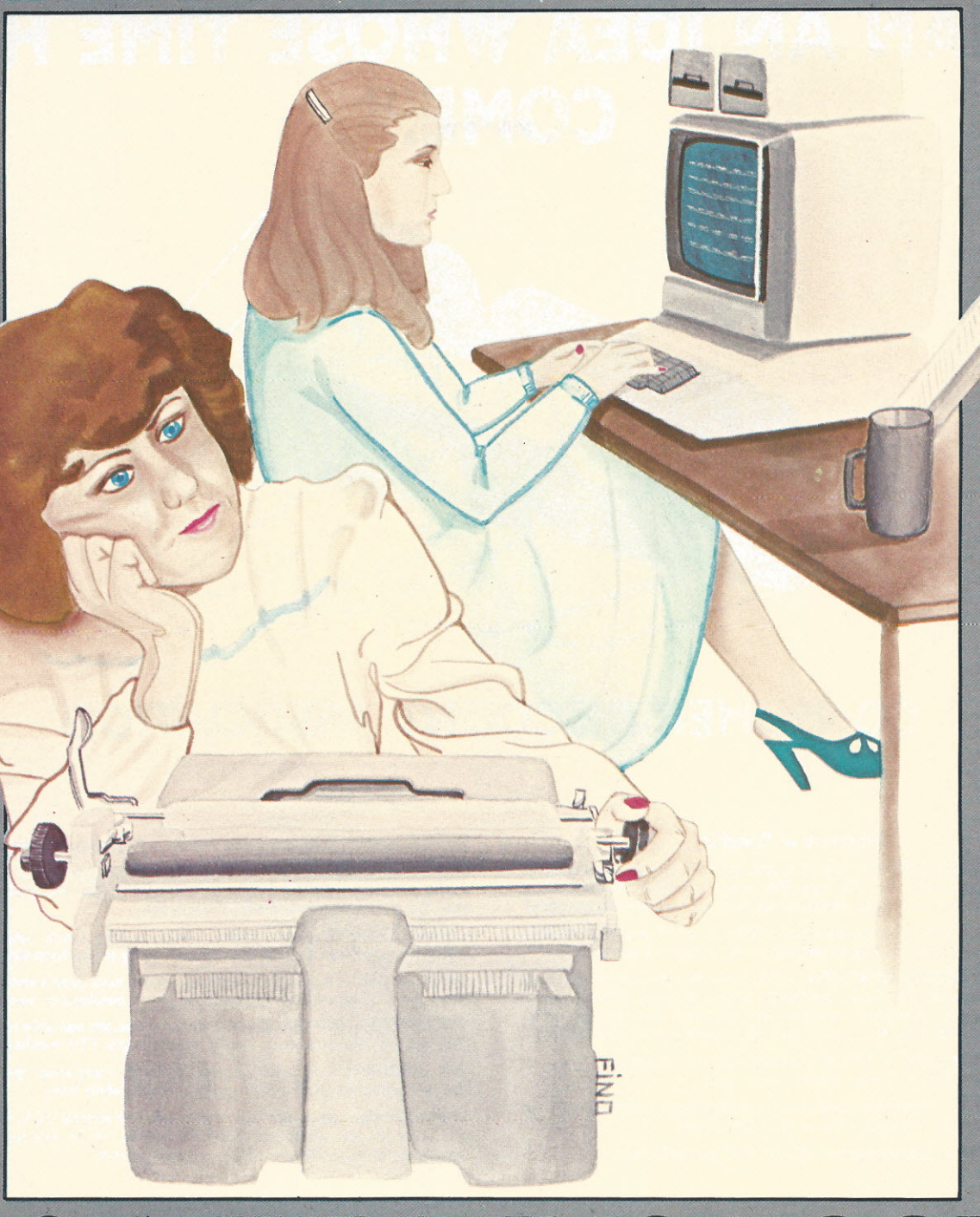


AS A WRITING TOOL

by Tom Lukers, Ph.D.

Professional writing will probably be affected more by the microprocessor than almost any other field of work. In recent years, "word processing" has become almost synonomous with "writing." And it seems as if a new word processor hits the market almost every day. The writer has an almost bewildering variety of systems available. And each has its strengths and weaknesses. But we have a difficult time in finding out what they are.

What is a word processor? How does it differ from a text processor? Which is best? And where does the computer fit into the picture? And, for hard-core writing, which is best, a prepackaged word processing system, or a computer?

First, let's define the environment wherein the system will operate and the jobs that it must do. We're talking about hard-core writing. That is, writing, editing

and/or publishing a wide range of books and other publications for the industrial and educational communities. These may include books of several hundred pages, with dozens of photographs, illustrations, tables, graphs, charts and notes. The client defines the format final delivery medium, and, generally the size of the finished product.

On the other hand, the product could be an engineering proposal, advertising brochure, industrial training movie script or tutorial on using the client's product in the classroom or industrial plant. Again, the client will usually have his/her own ideas regarding format, page size, etc. He may insist that the work be done on his premises. Governmental and/or industrial security considerations frequently make this a requirement, although it raises the cost.

Frequently, the project is bound by rigorous specifications regarding page numbering and layout, paragraphing, placement of footers and headers, and other constraints.

Recently, more industrial clients are using their own in-house text editing/processing systems. This means that the freelancer must be able to interface with a wide variety of systems. And he must be able to offer final copy on a variety of media, both hard-copy and magnetic. All these considerations affect the writer's arsenal. And they determine the desirable characteristics of a suitable system.

Although there are no hard and fast definitions describing all possible systems, several distinct categories seem to be emerging. For example, we have text editors, formatters, word processors and text processors.

Text editors permit us to create and/or manipulate text files. It may be simple or complex. With a good editor, we can do a lot of formatting without having to run the file through another formatter or processor. But usually, the editor is used as part of a two-step process. In the first step, we create and polish the text file. And we embed commands for the formatter or processor to use. During the second step, the formatter or processor executes the commands that were embedded during editing. It may be artificial, but the distinction is made on the basis of complexity.

For example, a programmer develops a program that will number pages automatically, justify right and left margins, and print a header on every page, and presto! We have another word processor. But the "processor" just described could more accurately be called a simple formatter.

Both text processors and simple formatters will accept a text file and execute commands that have been embedded during editing. After these commands are executed, the file is output as a finished document. The range and complexity of the commands performed by a processor are usually much greater than those of a simple text formatter.

Word processors are another matter. They usually involve a one-step process. For example, when creating a text file or in changing one, you see the result as it occurs. Only the most expensive systems, however, can display a full page of text. Usually, a half page is displayed at a time.

There are at least two ideal writing systems for every person who has to do any writing during his everyday work. And no two are identical. But the constraints of the environment just described tell us a lot about what we need. So here is a laundry list of desired features.

We will always do the editing function, at least. It doesn't really matter whether it is done during a one-or-two step process. But we must be able to do certain things. Here are some of the more important features of a good editor.

global search	global change
move block	block copy
within-the-line changes	type-ahead buffer
insert <CRC> for line break	merge broken lines
toggle line numbers	line RENUMBER command

buffer size of at least 25 pages

The global search and change commands are almost self-explanatory. We need to be able to quickly search an entire file and have the system display all occurrences of a string. For example, if we've finished a 50-page document for Mr. Smith, only to find at the last minute that his name is really Smitth, the global search/change feature will help us make the correction easily and painlessly. But it is important that each occurrence of the string be displayed before we make the changes.

Search/change feature is important

Many times, the string that we're replacing may also reside as part of other words. And eliminating all occurrences of the string could cause unwanted changes. But if the system displays all occurrences of the sought string, we can tell ahead of time the consequences of each change. The global search/change are probably the most valuable features of a good system. The next most valuable feature involves the block move/copy commands.

What do you do when you find that three paragraphs on page 15 actually should be in the middle of page 28? Well, you use the block MOVE command. You tell the system what lines of text you want moved. Then you tell it the line number that the moved block will follow. Then you give it the execute command. And there it is, just where you want it.

On other occasions, you might find that you need the same text to appear in two places. You would use the block COPY command to place a copy of the desired lines at the destination.

During editing, we frequently need to break a line at some point and possibly merge the last part of this line with the first part of the next. It is handy to be able to insert a carriage-return character <CRC> within an existing line. Insert the CRC and the line breaks into two parts. Then we can use the MERGE command to merge the two line fragments.

Undoubtedly there are other commands that could be included, but we already have a lot of control over our text files. We can create, modify and format our files. And we can input commands into the raw text file that will be executed by the processor during the next phase.

The processor does a number of jobs for us. First, it permits us to set up the page format to fit our needs. We want to be able to change format by using global

commands as much as possible. Here are some of the more important parameters:

line length	page length
placement of headers	paragraph indenting
placement of footers	placement of page numbers
right justify	left justify
right margin	left margin
tab stops	vertical spacing

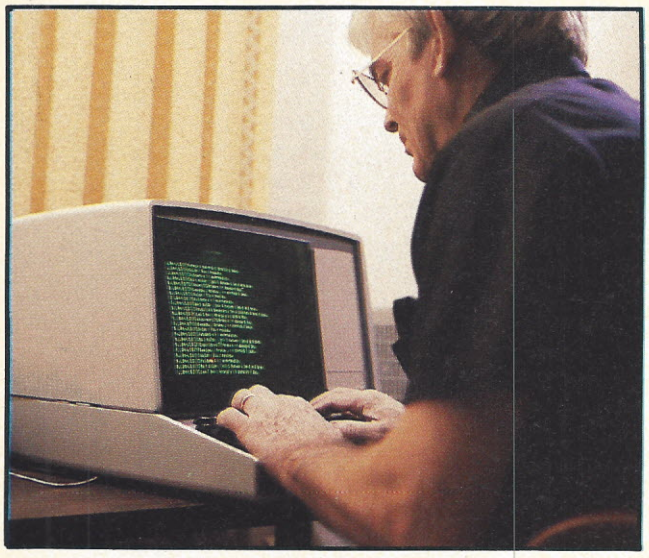
Extended macro capabilities give us almost unlimited control over the final document. For example, we may do double column printing and make changes even at run time. But a good processor does more than that. It makes it possible for us to execute global commands that were inserted into the text file during editing, or set up conditional commands and set traps for their execution.

A good processor will make it possible for us to set up a profile to meet certain format specifications. Then we only need to set it up once to have it ready for instant use as needed. And there are other functions.

For example, do we want the page number to be centered on the top of the page, or the bottom? Sometimes we want it to be placed according to page number. Then, even numbered pages will be numbered at the bottom left, with odd numbered pages numbered at the bottom right. We might want headers and/or footers placed conditionally, also—automatically.

A good processor will allow us to insert a trap that places a table on the first page after we mention it in the text. For example, if I mention table 3-6 on page 3-22, I would want to have it automatically placed at the top of page 3-23 without manual intervention.

A good text processing system will have other features. It will permit us to define our own macros to be used at will. And we will have access to number registers to help us in setting up conditional macros. Ideally, we will be able to keep track of all paragraph headings and automatically output a table of contents when the job is finished. And we should be able to use any method of paragraphing that the client specifies—automatically.



With a good microcomputer system and excellent software, the writer can forget most of the mechanics of writing and concentrate on his main task — producing books and other large documents to the client's specifications.

For example, it is quite popular in some circles to number paragraphs decimally, e.g., 1.1, 1.1.1, 1.2, 1.2.2, etc. Having to keep track of such nonsense manually can put you over the edge quickly. So it helps to have a text processor that will do the bookkeeping on this one for you.

And what about footnotes? It is still sometimes required that footnotes be handled in the old, formal way, with a line across the page separating the footnote from the text with the footnotes numbered sequentially. Many formal documents are still done this way. A good text processor will enable us to define a footnote macro to be called up and executed as needed.

One of the most important features of a good text processor for hard-core writing is the ability to print or display specified pages from a file after processing. Frequently we have to produce documents of several hundred pages with the paragraphs, pages, tables and illustrations numbered sequentially. During the revision cycle, it becomes essential for us to be able to output a specified group of pages rather than the entire file. For example, if we have just revised pages 4-156 through 4-183, it is impractical to have to output pages 4-1 through 4-183 to see the effects of the changes. Or to give the client copies of the revised pages.

We have other important considerations. For example, we would like the system to be portable and low-cost, without built-in obsolescence. And we want the files created on one system to be transportable to others.

There appears to be no single system within the reach of a freelancer that can do all of the things outlined here. The typical industrial system is usually based on a minicomputer or mainframe, with software costing thousands of dollars and continually under development. And most integrated word processing systems are aimed at the business/secretarial user market. Even the software designed for microcomputers seems to be aimed at this same market/end user.

So to be able to provide the kinds of service described here in a competitive market usually will require more than one microsystem because no system has all the features needed. Here are the key elements of the solution I have evolved.

I do not use an integrated word processing system. Instead, my solution uses microcomputers for several reasons. First, I don't know of a prepackaged system that can do all of the things I need, because they are usually the result of a client's requirements, sometimes being defined on the fly. Next, prepackaged systems are probably outside my budget. Also, I don't like to be restricted to one single source for software and other system requirements. And the best dedicated processor around today could be obsolete tomorrow.

Part of my solution involves an S-100 mainframe microcomputer with two different systems. Each system serves special functions. The first handles those jobs requiring automatic decimal-numbered paragraphs, multiple-column printing and automatic generation of the table of contents. For those tough jobs, I couldn't get along without it.

For other jobs I pull three cards and insert two others

Continued on page 144

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Paper Tiger 460 Print Sample

But its most important feature is high reliability. Paper Tiger 460 is designed to be tough and dependable. It has rugged, stepper-motor head and paper drives. A new rugged ballistic-type print head.

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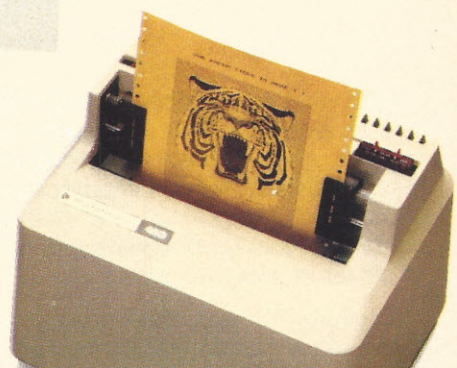

Paper Tiger 460

Integral Data Systems, Inc.

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Make Way for Minis

by David A. Holcomb

Just what is a minicomputer? A few years ago, that was an easy question to answer...but today, it's a lot tougher, since there are so many small business computers available. A minicomputer used to be considered a piece of computing gear that did not take up a complete room for hardware and did not need an army of slaves to keep it running.

Basically, it was dedicated to a single purpose: stand-alone computing. Compared to a mainframe, it was inexpensive, slower and easier to use. It had a word size and data path size of less than 32 bits—generally 16—and a limited amount of program space (64K bytes). And you could still attach printers, card readers, paper tape reader/punches, terminals and magnetic tape units to it. But that definition, as vague as it was, has recently changed.

Today, it's even more difficult to define it precisely. Minis are still smaller than the giant mainframes, but, in some instances, just barely so. There are minicomputers on the market that boast of a 32-bit word size, 4 megabytes of memory and computing power (read speed) that fairly sneaks up to the giant mainframes.

Nevertheless, a minicomputer might be defined as any computer that is physically smaller than a mainframe (IBM 370, CRAY-1, etc.), whose central processor is not based upon a monolithic (single chip) CPU, and whose word size is at least 16 bits. This definition may not be precise enough for some, but for our purposes, it will suffice.

When minicomputers first appeared they were eagerly devoured by businesses and applications that required a dedicated computer. They were placed in factories for numerical control (the technique of having a computer control the functions of a tool) and process control (making sure the right thing gets done at the right time). They were also used by scientists in laboratories for monitoring and data collection, by schools for education, and by large and small companies in applications ranging from business data processing to interactive computer graphics.

Minicomputers were chosen for a variety of reasons, but the main attractions were their small size and reasonable price. Another factor was sensitivity to the environment. Minis could be easily placed in or close to the factory environment and could be dedicated to a

single application, since their cost was so much less. But alas, along came the microcomputer. At first, micros were just laboratory novelties or toys, but sophistication has descended upon them—shaking the mini's foothold.

What are the advantages of a mini over a micro? A lot depends upon the application, but modern minis are especially strong in flexibility. This is not intended to degrade the micro's capability, but the mini is still king to a lot of users.

Today's machines are capable of tremendous upward expansion in usable memory space and in the types and quantities of peripherals that can be attached. They are faster and have the capability of having floating point hardware modules attached to them integrally for scientific uses.

Almost every computer language is available to the mini programmer. Minis are also easier to program data requiring arithmetic operations and precision. In the 8-bit micro world, programmers have to worry about overflowing their registers and must perform double-precision calisthenics for data computations on numbers larger than 255.

But just as mainframes are now fixed chunks of computing iron, minis are slowly following suit. Micros are no longer just scientific curiosities; they are true computers with ever increasing flexibility. Just as yesterday's minis were being dedicated to single applications due to their inexpensive nature, the micros are coming out ahead, since they are less expensive to purchase and operate.

More high level languages are becoming available to the micro user, so that he can better implement an application. For example, the PL/1 programming language was formerly available only on large IBM mainframes, but it soon became usable on minis. Now, the micro user can also use true PL/1 on his 8080 based machine. Soon every micro will have the flexibility of using this high-level language instead of the usual Basic.

Every day, micro manufacturers and vendors are beefing-up their hardware with very sophisticated software that formerly was only found on first the mainframes, then the minis. The advantages of using a micro system are becoming more attractive all the time. Gone are the worries of providing special air conditioning and pure (not noisy) A.C. power to your computers. Gone also are the worries of having to fully utilize your machine 24 hours a day, due to ever-increasing cost. And raw computing horsepower is not so much a consideration in choosing a micro over a mini. One can buy a full 16-bit micro system with the same power and flexibility as some of the earlier systems. There is even talk by some major micro manufacturers of a 32-bit micro with full single- and even double-precision floating point hardware modules. For now minis still have the edge over micros when it comes to raw number crunching speed. But who knows what tomorrow holds for the perenniel mini vs. micro battle?

Following is a sampling of some major mini systems. Since there are so many on the market, this is intended as a representative survey, not an in-depth presentation.

The mini buyer's world is a little different from that of the micro buyer. Most of the micro systems sold are targeted for either personal (home) or small business computing. Since most mini systems are too expensive for the average person, home computing was never a mini manufacturer's concern. The mini was originally targeted to fill the void between no computer at all and the large mainframe. This was a general purpose marketplace, but, with the advent of the micro, small businesses turned to these systems for help. (They previously had depended on service organizations to do their data processing.) Thus, the small business system was born.

Only recently did the mini manufacturers start to get on this lucrative bandwagon. So, the systems presented here may not be strictly tailored to the small businessman. That is why some general-purpose systems listed don't come with even one high-level language supplied as standard: software comes extra.

Here is a sampling:

DEC (Digital Equipment Corporation). DEC is famous for its PDP11 series of general purpose computers. They are often referred to as the IBM of minicomputers. The offerings range from small, general purpose micro systems (LSI11) to the gigantic VAX 11/780.

Data General Corp. DG is another biggie in the general purpose computer field. It has recently entered the small business field with the Nova 4 and Micronova machines. The newest release, the 32-bit MV/8000, promises to be a hearty contender in the megamini marketplace.

Hewlett-Packard (HP). Once primarily known for its scientific and laboratory instrumentation product line, HP has recently entered the business and scientific data processing circles. HP started the hand-held pocket calculator business and also made the Basic language popular in the mini world.

Honeywell. This is one of the big mainframe manufacturers that has decided to get a portion of the very profitable small business market. The company is well respected for good systems.

IBM. Here is the biggest of the biggies that has expanded downward with incredible facility. IBM's Series/1 machines are small but have that well known IBM know-how for solving all sorts of business applications. The product line has several models to choose from with the capability of hooking up to 16 units in a "ring" that enables all processors to talk to each other for data sharing and communicating.

Prime. Prime offers a 32 bit machine that is targeted for the general-purpose market. It is not primarily designed to meet the small business needs, thus offers no business packages. One must look to software and systems houses for them.

Systems Engineering Labs (SEL). This is another manufacturer offering a 32 bit megamini. These machines are primarily used in high-speed, real-time data acquisition application. They have very fast machines and, again, offer no business software.

Wang Laboratories. Wang is now becoming well known for its small business machines. The product line also includes powerful word processing capabilities and full data processing packages. The office automation marketplace is a primary target. □

Charts follow

Table 1. Hardware Data

MANUFACTURER	SYSTEM	BASIC PRICE	CPU BITS	RAM (K BYTES)		MASS STORAGE (TYPE*/MBYTES)		TERMINALS (QTY.)		PRINTERS (QTY./SPEED)**	
				STD	MAX	STD	MAX	STD	MAX	STD	MAX
AM Jacquard 3340 Ocean Park Blvd. Santa Monica, CA 90405	J500	$15,000	16	128	128	F/1.0	C/48	1	1	1/40cps	1/300lpm
	J100	$25,000	16	96	128	F/0.5	C/320	1	14	1/40cps	3/300lpm
AutoScript, Inc. 11 Mountain Ave. Bloomfield, CT 06002	Stand-Alone	$28,940	NA	64	128	C/10	C/40	3	8	1/120cps	2/120cps
	On-Line	$55,000	NA	256	256	W/67	W/300	None	60	30/120cps	40/120cps
Basic Four 14101 Myford Rd. Tustin, CA 92680	580	$15,990	8	128	320	C/3.2	C/17	1	4	1/80cps	5/300lpm
	730	$95,000	8	96	512	C/150	C/600	4	32	1/300lpm	16/600lpm
Centurion Computer Corp. 1780 Jay Ell Dr. Richardson, TX 75081	100	$14,938	8	32	64	F/2.4	F/3.6	1	4	1/75cps	3/200lpm
	111	$30,367	8	64	64	C/10.4	C/83.2	1	4	1/150cps	600lpm
Data General 4400 Computer Dr. Westboro, MA 01581	NOVA	$55,000	16	128	256	W/25	C/1696	4	16	1/180cps	2/900lpm
	MV/8000	$250,000	32	1024	2048	C/277	C/2376	16	64	1/600lpm	2/900lpm
Digital Equipment Corp. 129 Parker St. Maynard, MA 01754	Datasystem 300	$17,600	16	64	256	F/1.0	F/2.0	1	4	1/180cps	1/900lpm
	Datasystem 750	$110,000	32	512	2048	C/56	C/2400	1	16	1/300lpm	4/1800lpm
Evolution Computer Systems 17911 Skypark Circle, Ste. E Irvine, CA 92714	Series II Model 240	$32,950	16	64	1024	W/33	W/132	1	32	1/150cps	2/1200lpm
	Series II Model 280	$94,500	16	256	1024	C/200	C/4800	1	64	1/600lpm	4/1200lpm
Hewlett-Packard 1501 Page Mill Rd. Palo Alto, CA 94304	3000/44	$109,445	16	1000	4000	C/50	C/1900	4	96	NA	4/45ppm
Honeywell Information Systems 200 Smith St. Waltham, MA 01821	Level 6 Model 57	$46,975	16	32	2048	NA	C/640	1	144	1/30cps	4/900lpm
International Business Machines P.O. Box C-1645 Atlanta, GA 30301	Series 1	$8,500	16	16	512	F/1.2	F/2.4	1	12	1/40cps	1/160cps
Microdata Corp. P.O. Box 19501 Irvine, CA 92713	Reality 2000	$35,285	8	32	64	C/10	C/20	1	8	1/165cps	4/600lpm
	Reality 6000	$62,275	8	64	128	W/50	W/514.8	2	32	1/150lpm	4/600lpm
Mylee Digital Sciences, Inc. 155 Weldon Parkway Maryland Heights, MO 63043	S-3000	$38,000	16	88	280	C/12	C/48	2	16	1/65lpm	8/300lpm
Nixdorf Computer Corp. 168 Middlesex Turnpike Burlington, MA 01803	8870/1	$30,750	16	96	256	C/10	C/66	1	16	1/10cps	8/300lpm
	8870/3	$54,150	16	128	512	C/26	C/264	1	32	1/300lpm	16/300lpm
Pertec Computer Corp. 12910 Culver Blvd. Los Angeles, CA 90066	8500	$29,900	16	96	256	C/32	C/96	1	14	1/160lpm	3/300lpm
	9500	$64,900	16	96	256	C/160	C/320	1	14	1/160lpm	3/300lpm
Prime Computer, Inc. Prime Park Natick, MA 01760	450	$73,000	32	256	1024	C/32	C/2400	1	32	NA	1/1000lpm
Quodata 196 Trumbull St. Hartford, CT 06103	Q620	$39,900	16	192	256	C/20	C/40	1	NA	NA	NA
	Q870	$130,280	16	256	1000	C/67	C/1000	NA	NA	1/180cps	NA
Rexon Business Machines, Inc. 5800 Uplander Way Culver City, CA 90230	RX15	NA	16	64	64	C/10	C/10	1	4	1/120cps	2/300lpm
	RX30	NA	16	64	128	C/20	C/40	1	8	1/120cps	4/300lpm
Sentinel Computer Corp. 9902 Carver Rd. Cincinnati, OH 45242	Model 40	$34,600	16	128	1000	W/29	C/1200	2	17	1/150cps	17/150cps
	Model 80	$48,500	16	128	1000	C/80	C/1200	2	17	1/150cps	17/150cps
Texas Instruments, Inc. P.O. Box 2909 Austin, TX 78759	DS990/4	$27,250	16	128	2000	C/10	C/10	1	25	None	10/600lpm
	DS990/30	$99,000	16	128	2000	C/200	C/200	1	25	None	10/600lpm
Wang Laboratories, Inc. 1 Industrial Ave. Lowell, MA 01851	2200VS	$22,000	32	128	512	F/0.3	C/800	8	32	1/120cps	4/600lpm

*C = Cartridge/Pack
W = Winchester
F = Floppy

**cps = characters per second
lpm = lines per minute
ppm = pages per minute

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Table 2. Systems Software Data

MANUFACTURER	SYSTEM	OPERATING SYSTEM		PROGRAMMING LANGUAGES				
		Single User	Multi User	Assembler	Basic	Cobol	Fortran	Pascal
AM Jacquard	J500	Std	None	Std	Std	No	No	No
	J100	Std	Std	Std	Std	No	No	No
AutoScript, Inc.	Stand-Alone	None	Std	Std	No	No	Std	No
	On-Line	None	Std	Std	No	No	Std	No
Basic Four	580	None	Std	No	Std	No	No	No
	730	None	Std	No	Std	No	No	No
Centurion Computer Corp.	100	None	Std	Std	No	No	No	No
	111	None	Std	Std	Opt	Opt	No	No
Data General	Nova	None	Std	Std	Std	Opt	Opt	Opt
	MV/8000	None	Std	Std	Std	Opt	Opt	Opt
Digital Equipment Corp.	Datasystem 300	None	Std	Std	Std	No	Opt	No
	Datasystem 750	None	Std	Opt	Std	No	No	No
Evolution Computer Systems	Series II Model 240	None	Std	Std	Std	No	No	No
	Series II Model 280	None	Std	Std	Std	No	No	No
Hewlett-Packard	3000/44	None	Std	Std	Std	Opt	Opt	NA
Honeywell Information Systems	Level 6 Model 57	None	Std	Opt	No	Opt	No	No
International Business Machines	Series 1	None	Std	Opt	No	Opt	NA	No
Microdata Corp.	Reality 2000	None	Std	Std	Std	NA	NA	NA
	Reality 6000	None	Std	Std	Std	NA	NA	NA
Mylee Digital Sciences, Inc.	S-3000	None	Std	NA	NA	NA	NA	NA
Nixdorf Computer Corp.	8870/1	None	Std	NA	Std	No	No	No
	8870/3	None	Std	NA	Std	No	No	No
Pertec Computer Corp.	8500	None	Std	Std	Std	No	No	No
	9500	None	Std	Std	Std	No	No	No
Prime Computer, Inc.	450	None	Std	Std	Opt	Opt	Opt	No
Quodata	Q620	None	Std	Std	Std	Opt	Opt	Opt
	Q870	None	Std	No	Std	No	No	No
Rexon Business Machines, Inc.	RX15	None	Std	Std	Std	No	No	No
	RX30	None	Std	Std	Std	No	No	No
Sentinel Computer Corp.	Model 40	None	Std	No	Std	No	No	No
	Model 80	None	Std	No	Std	No	No	No
Texas Instruments, Inc.	DS990/4	None	Std	Std	Opt	Opt	Opt	Opt
	DS990/30	None	Std	Std	Opt	Opt	Opt	Opt
Wang Laboratories, Inc.	2200VS	None	Std	Std	Opt	Opt	No	No

Table 3. Applications Software Data

MANUFACTURER	SYSTEM	Word Processing	DBMS	General Ledger	Accounts Payable	Accounts Receivable	Payroll
AM Jacquard	J500	Std	No	Std	Std	Std	Std
	J100	Std	No	Std	Std	Std	Std
AutoScript, Inc.	Stand-Alone	Opt	Std	No	No	Std	No
	On-Line	None	Std	No	No	Std	No
Basic Four	580	Opt	No	Opt	Opt	Opt	Opt
	730	Opt	No	Opt	Opt	Opt	Opt
Centurion Computer Corp.	100	Opt	No	Opt	Opt	Opt	Opt
	111	Opt	No	Opt	Opt	Opt	Opt
Data General	Nova	Std	No	Opt	Opt	Opt	Opt
	MV/8000	Std	No	Opt	Opt	Opt	Opt
Digital Equipment Corp.	Datasystem 300	NA	No	Opt	Opt	Opt	Opt
	Datasystem 750	NA	NA	NA	NA	NA	NA
Evolution Computer Systems	Series II Model 240	Opt	Std	Std	Std	Std	Std
	Series II Model 280	Opt	Std	Std	Std	Std	Std
Hewlett-Packard	3000/44	Opt	Opt	NA	NA	NA	NA
Honeywell Information Systems	Level 6 Model 57	NA	Opt	Opt	Opt	Opt	Opt
International Business Machines	Series 1	Opt	Opt	Opt	Opt	Opt	Opt
Microdata Corp.	Reality 2000	Std	Std	Opt	Opt	Opt	Opt
	Reality 6000	Std	Std	Opt	Opt	Opt	Opt
Mylee Digital Sciences, Inc.	S-3000	No	None	Opt	Opt	Opt	No
Nixdorf Computer Corp.	8870/1	No	No	Opt	Opt	Opt	Opt
	8870/3	No	No	Opt	Opt	Opt	Opt
Pertec Computer Corp.	8500	Opt	Opt	Opt	Opt	Opt	Opt
	9500	Opt	Opt	Opt	Opt	Opt	Opt
Prime Computer, Inc.	450	NA	Opt	Opt	Opt	Opt	Opt
Quodata	Q620	Std	Std	Opt	Opt	Opt	Opt
	Q870	Std	Std	Std	Std	Std	Std
Rexon Business Machines, Inc.	RX15	Opt	Std	Opt	Opt	Opt	Opt
	RX30	Opt	Std	Opt	Opt	Opt	Opt
Sentinel Computer Corp.	Model 40	Std	Std	Std	Std	Std	Std
	Model 80	Std	Std	Std	Std	Std	Std
Texas Instruments, Inc.	DS990/4	Opt	Opt	Opt	Opt	Opt	Opt
	DS990/30	Opt	Opt	Opt	Opt	Opt	Opt
Wang Laboratories, Inc.	2200VS	Opt	Opt	Opt	Opt	Opt	Opt

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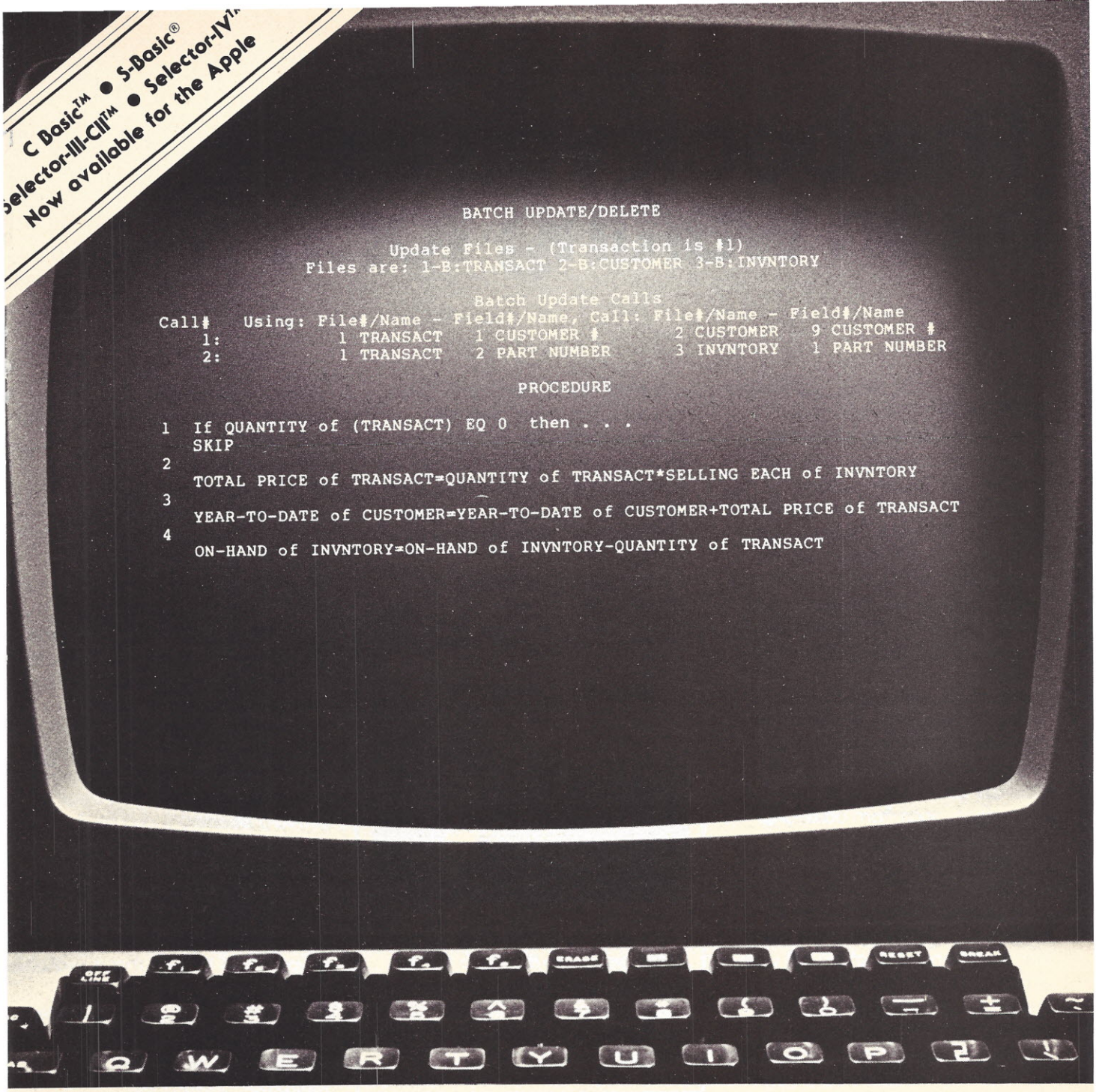

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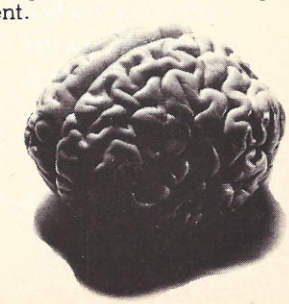

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The book you've been waiting for...

Ever since Radio Shack sold the first TRS-80 Model I users have been searching for detailed information about its inner workings that Tandy would not, or could not, make available. In particular the Level II BASIC from Microsoft contains dozens of subroutines that can be tremendously useful to any programmer, but Tandy Corporation is probably under contractual obligation to Microsoft not to supply information (if they even have it!).

Dedicated users, proficient in assembly language, have disassembled the Level II ROMs and made their own comments. But the majority of users are left in with virtually no information, apart from occasional articles and whatever they can decipher on their own.

ENTERPRISING USERS - Several of the more enterprising programmers realized that if they published their own comments a lot of TRS-80 users would buy them. The BOOK, Disassembled Handbook and Supermap are some of the available books giving comments on the ROM set - but they all suffer from serious drawbacks, being either incomplete, unintelligible or even worse - inaccurate!

Incomplete books are usually published when the author has not finished understanding what he's writing about. Hence the "continued next book" lines in some publications, translated into english read "buy another book when I've done some more work". Unintelligible books are due to poor editing, or no editing at all! Inaccurate information is a result of not checking with anyone else.

Microsoft BASIC Decoded & Other Mysteries is both complete and understandable. Nearly 7,000 lines of comments for the Level II ROMs, with an additional 6 chapters of useful information, make this the biggest and best book available on the subject.

Written by James Farvour, the comment section took more than a year to finish - it even includes the changes for the latest ROM set in an appendix. Edited by Jim Perry, until recently managing editor of 80 Microcomputing, the text and comments are understandable.

Complete & Understandable - IJG, publishers of TRS-80 Disk & Other Mysteries, could have published an incomplete or unintelligible book on the ROMs - but chose to wait and do it properly.

Tested examples are given for virtually every ROM subroutine, showing you how to CALL them from BASIC or use them in an assembly language program. With more than 300 pages Microsoft BASIC Decoded & Other Mysteries is by far the largest book about Level II available.

Copyright - In order to respect Microsoft copyright the actual disassembled code is not printed, but the book is designed to come apart and fit into a standard 3 ring binder with your own disassembly (all pages are pre-drilled).

In short, Microsoft BASIC Decoded & Other Mysteries, is the most complete, understandable and accurate guide to your Level II ROMs that is available - bar none!

Pick one up at your nearest IJG dealer, phone your order in or use the coupon - satisfaction guaranteed.

FOR TRS-80 USERS

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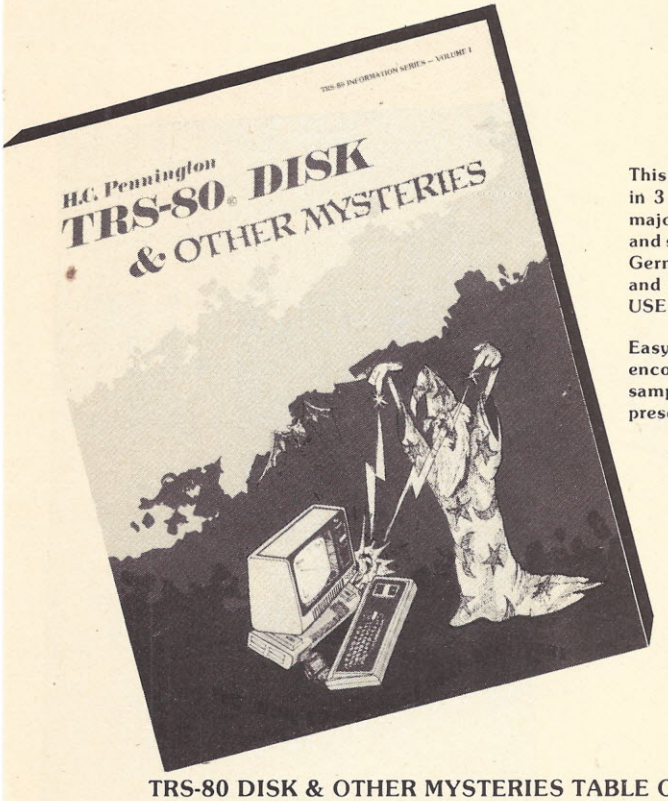

This valuable textbook, the first in a series by H. C. Pennington, has been reviewed in 3 major magazines and has been the topic of extensive conversation on two major computer communications networks. Presently, the book is being distributed and sold throughout the United States, Canada, the Union of South Africa, England, Germany, Australia, the Netherlands & others. William Barden, Jr., a well known and widely published computer author comments, ". . . my advice is to get it and USE it!"

Easy to read, entertaining material covers nearly every aspect of the many problems encountered on the TRS-80 system with disk storage. Actual examples, problem samples, memory maps, "how to fix . . ." solutions and countless illustrations are presented throughout.

Author: H. C. Pennington Publisher: IJG Computer Services
First Edition - Second Printing - Soft Cover - 130 Page
8½" x 11 — Wt. 1 lb. — Retail price: $22.50

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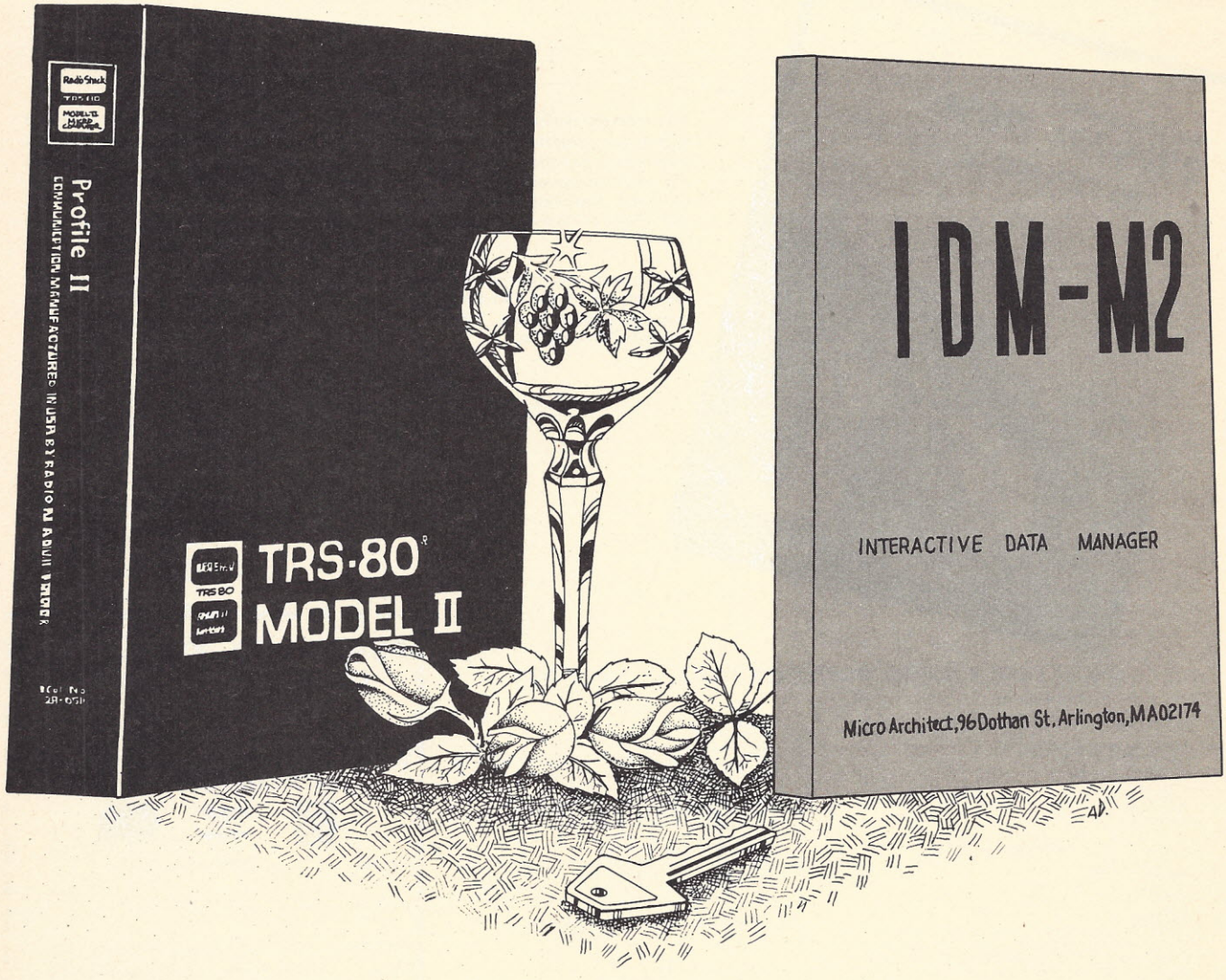
THE DBMS CONCEPT: 'TURNKEY SOFTWARE'



by Robert S. Jones

Many businessmen who have recently acquired a small computer system seem perplexed as to how they can rapidly benefit from it without investing months learning an unfamiliar computer language and the idiosyncracies of an operating system. Programming becomes analogous to playing a piano without lessons. It takes months to learn and great patience to understand the logical design relationships.

Now the small businessman has been given a device to solve his applications dilemma: the data base management system (DBMS). A carefully designed magnetic tool box of powerful business functions, it allows the nontechnical user to design his own data reporting systems—"turnkey" software, so to speak.

Two such offerings are the IDM-M2 (Micro Architect, Arlington, MA) and Profile II (Radio Shack, Ft. Worth, TX), designed for operation with the TRS-80 model II computer. Each has the same goals in mind, but approaches the product solutions differently.

The IDM-M2 is a single disk system designed to operate as three separate menu-driven modular program packages that must be loaded individually. The first module is the data initialization program (DINIT), allowing the user to specify the type and relationship of

	Radio Shack Profile II	Micro Architect IDM-M2
Screen Format Organization	Adjustable	Fixed
Screen Formats Available	5	1
Report Format Organization	Adjustable	Fixed
Report Formats Available	5	10
Label Format Organization	Adjustable	Fixed
Label Formats Available	5	1
Label Output Format Options	5	1
Expandable Files	Yes	No
Search/Find	Yes	Yes
Data Filtering	No	Yes
Menu Listings	Yes	Yes
Security	Yes	Yes
Multi-Level Sorts	No	Yes
Data Arithmetics	No	Yes
Hi Speed Sort	Yes	Yes

Figure 1. DBMS comparison features.

information to be processed. It requires only that the user identify the title of the data base (file name) and the elements of information with the number of characters expected in each answer (field length).

The number of elements in each data block (record) is limited to 20 alphanumeric fields and 20 numeric only fields. An operator security code system has been designed to prevent unauthorized access. It has two levels of entrance. Operator interrogation and changing of the data (read/write) are assigned one code, while the read only entry has another. This provides multi-user access without fear of an operator accidentally destroying or altering a file.

The second module (IDM) lets you manipulate data, add, display, print, delete or update a record, as well as define up to 10 report writing modes. Each mode allows you to specify the page heading; select fields and filtering criteria; sort records on multiple fields; and perform field calculations including totals, averages, multiplications and divisions. An optional audit log mode provides a printed record of any changes.

A unique feature is the filter option which, in effect, is a pre-sort, saving unwanted data from entering the computer working memory. This allows a larger number of requested records to be entered and manipulated.

The multiple field sort option allows you to select and organize your data output by sort priority. An example would be to sort a library of books first by publishing house, then by alphabetical title within each house.

The final module (DREPORT), the report generator, produces standard reports that were previously defined by the report writer section of the IDM module. It also allows the user to print out the data in a general record format, which was defined by the original DINIT and IDM modules.

In an application test of the program, 740 records containing 13 alphanumeric fields with the average field length of 14 characters were entered without incident or loss. But when the program was put in the report generator mode, it could not load more than 225 records before it used up the RAM memory. The filter option was used to break up the number of records being sorted at one pass to 200. This actually wasn't a painful problem; it proved to be an asset.

It was soon found that sorting 100 records at a pass was three times faster in overall through-put than 200 at a time, as the actual efficiency was gained by the printer. More room in RAM memory allowed for fewer pauses of the printer, as the computer recycled with additional data.

The sorting of all records at each pass, whether 200 or 100, was imperceptively fast—less than one second. This is because the program uses a machine language sort approach.

Profile II

The Profile II, by Radio Shack, is one large program divided internally into 10 menu driven functions.

The first function sets up the file name and data field labels. This is broken into four segments. The first segment contains 36 information fields of data, but only 85 characters maximum. The succeeding three segments also hold 36 fields, but up to 256 characters. Unfortunately only those fields in segment one can be used to search or sort.

Function two allows the user to define his screen format display, putting data requirements where necessary. This comes in handy when you are trying to duplicate a form that the operator may be reading input data from. It saves possible data entry errors. A screen

Initialization Step (Question)	Data Entry Step (Answer)	Answer Size
TITLE:	. . . . .)	36 Characters
AUTHOR:	. . . . .)	20 Characters
PUBLISHER:	. . . . .)	6 Characters
PRICE:	. . . .)	4 Characters
READING LEVEL:	. .)	2 Characters
SUBJECT CATEGORY:	. . . .)	4 Characters
ISBN NUMBER:	. . . . .)	13 Characters

Figure 2. Library reference program

security code is assignable to the five different user format selections available.

A good security lock requires several operations to obtain: limit menus; password access to specific screen format; and purge creative files from end user disk. IDM-M2 only requires a password for a secured data file and is extremely difficult to break.

Function three provides the user with five report output formats possible. The reports are designed by the user's requirements on the display screen, which provides formatting expansion from 80 to 132 characters. This feature is exceptionally convenient, as one can visually maneuver the final data into effective layouts prior to printing, insuring a single useful

A good security lock requires several operations to obtain

end product. This function also provides a security password system.

Function four provides a formatting capability for labels with five user definable selections. A security coding system for each format layout is also provided.

Function five sets up selection formats for use with Radio Shack's Scripsit word processing program, a valuable addition to expanding the application potentials.

Function six is used to expand existing files when they have become filled, similar to adding a sixth drawer to a five drawer file cabinet. This feature really is handy, as data files do not become obsolete as the data handling requirement exceeds original plans.

Function seven provides the add, inquire and update capabilities for user data entry. Although the program currently does not have a data manipulation capability overall, it does allow for simple addition and subtraction of defined data fields.

Functions eight and nine set up sort routines, selection of fields and formats to be printed by an 80 or a 132 character printer for reports and labels.

Function 10 provides a profile directory of the program options.

In an application test similar to that of the IDM-M2, the program loaded input data and executed the output and format data instructions flawlessly. Since machine language programming was also used, sorting was immediate and no printer pauses were noticed.

The sort program differs in that IDM-M2 loads each entire record into computer memory and the sort keys are then extracted. Profile II reads each record and only loads those record numbers that comply with the selected sort keys. It then prints the sorted data by a look up table generated by the sort program and prints the format data requested. Each look up is executed while the printer is active, thereby economizing on through-put time. (See figure 1.)

Many other features exist that make both systems extremely useful and valuable. Each is distinctive by the tools provided. As is always the case, documentation is a key evaluation factor.

Profile II's manual is relatively good, easy to understand and, most importantly, assumes that the user has no prior knowledge of computer operation or techniques. Within a day, you should be able to design and implement your first application successfully.

The IDM-M2 manual is quite a different story. It is geared not for the uninitiated and assumes a good working knowledge of the TRS-80 model II and its disk operating system. Being somewhat disjointed in organization, this hampers a quick understanding of operational features and limitations. It will take a novice about a week to digest and implement an application; a seasoned vet can do it in a day or two. Despite this drawback, IDM-M2 is a good and reliable workhorse with exclusive options in arithmetic.

Once understood, IDM-M2 is somewhat simpler to use, as the primary formats of data presentation are fixed and the program does not contain the many optional data layout features of Profile II. IDM-M2 best fits data handling requirements that are relatively large, complex and not requiring designed output forms. Profile II best fits applications where tailoring presentation screen and output formats are needed and arithmetic is not.

Both programs are capable of handling thousands of data records (dependent on number of fields per record) and can be enhanced by compatible word processing programs offered. At this writing, both companies are in the process of upgrading the documentation to enhance ease of understanding.

With the differences and capabilities of the two systems in mind, how can they be applied to an individual situation?

Like any tool, they will only be as powerful and accurate as the skill and imagination of the user. Skill requirements are minimal and imagination is nurtured by success. If you have one application in mind, you will have 20 by the time you have implemented the first.

To begin, define an application like inventory, mail list, sales prospect list, cross references, stock market information or directories.

Follow set procedure

List the questions that must be answered. Next to them list the number of characters the longest answer will take. The shorter the question prompt, the shorter the response, allowing more format flexibility. Define the different ways you would like the data manipulated, sorted and displayed as a final result. Each block of input information is automatically assigned a record number by the program. Field information will be processed according to the format designs. Figure 2 displays a sample application.

Now your computer can sort by any of the above question labels separately, or in combination, for hundreds or thousands of data file records, producing an extensive and valuable cross reference. One cross reference could be an alphabetical listing of all authors and their books; another, all publishers grouped alphabetically, with titles listed the same way.

The possibilities for application and problem solutions are as close as your DBMS and computer. Tomorrow will hold even greater advances in DBMS design and capability, ultimately leading to the true "turnkey" software concept. □

CIRCLE INQUIRY NO. 154

Use all Your Terminal's Capabilities

by Jon Lindsay

You see them everywhere. It really is difficult to visit a computer store without observing the requisite Soroc IQ 120. Neatly packaged, it represents a standard for less expensive professional terminals and can be purchased for less than $1000. There may be others in the same league now and other others much "smarter", but the 120 was one of the early sophisticated terminals to be available—and it still is. Some things have changed along the way: previously optional features are now standard; descenders to lower case characters have been added. But it is functionally the same.

Except for the more professional programs one occasionally sees customized for a firm, a terminal can be seen sitting on a desk, mindlessly scrolling a program display, hour after hour. This superficial use is not simply confined to persons using the 120, but to many personal computer users in general. Perhaps the lack of any structured program display is due to the hardware, or the lack of programmer experience, or simply lack of concern about the way computer information should be displayed. One thing is certain: the user display format separates the amateur from the professional.

The 120 comes with many standard features that allow for professional programming. Yet, all too often its capabilities are wasted. Let's review some of the built-in capabilities of the 120 and explore how to implement a few of them.

A clear screen command can be accomplished by merely pressing the CLEAR key on the left side of the keyboard, but we want to do this with software as well. You will see all sorts of techniques used to accomplish this decisive event. The most primitive is to print a series of PRINT statements such that everything is simply scrolled off the screen. This works for almost any terminal.

The 120 will accept an escape (ESC) command followed immediately by a plus sign (+) to clear the screen. You will need a way of dealing with the ESC command as well as the Ascii code. Even if you are only using an 8K version of Altair-type Basic, you will be able to use the CHR$ statement. Thus, PRINT CHR$(27);"+" or PRINT CHR$(27);CHR$(43) will clear the screen to nulls (i.e. the screen goes blank). The terminal control commands must be back to back as they are received by the terminal. The CHR$(27) is simply the Ascii code (27) for ESC and the Ascii code (43) equals Ascii code for "+". There is no reason why either form could not be used.

This is a powerful programming tool. The program can start with a clear screen with the statement reprinted every time you need to clear up the screen. But after a while, it starts to get tedious typing PRINT CHR$(27);CHR$(43) each time the screen is to be cleared. Writing the statement as PRINT CHR$(27); CHR$(43):RETURN lets you call the statement as a subroutine, thus saving unnecessary typing.

Even better, however, would be to concatenate the two codes into a single string variable: LET CS$ = CHR$(27) + CHR$(43). This is normally placed among the first several lines of the program, so that the variable CS$ is assigned to memory. To clear the screen, just type PRINT CS$. This is probably the simplest way to do it, but any of these techniques will work. When the screen is cleared, the cursor is homed, i.e., it goes to the top left corner of the display.

How about clearing a line? If the output to the display is scrolling endlessly, why would you need to clear a line? You wouldn't; but, in a later program, this capability will be valuable. The statement to erase a line is PRINT CHR$(27);"T". Again, the Ascii code (89) may be used for "T". This results in all unprotected characters on the same line as the cursor to be nulled. This is handy when it is necessary to re-input data that might not overwrite the old input. The reason for this is to prevent a collecting of characters (left over) mingling with the new input which might confuse the operator. As before, implementation is greatly simplified by concatenating the two characters, i.e., Q8$ = CHR$(27) + CHR$(89).

An important concept is control of the cursor following one of the various control statements. Typing PRINT Q8$, for example, will cause the current line to be erased and a carriage return and line feed (CR/LF) to be issued. The end effect will be the cursor resting at the beginning of the next line. If new data was meant to be entered on the same line as was erased, a semicolon should have been added to the line erase. Thus, PRINT Q8$; erases the line and holds the cursor at the start of the same line in preparation for the next entry by suppressing the CR/LF. As some experimentation is usually necessary to get the exact effect desired, it is best to start by adding the semicolon to the control statement until the effect of the statement can be understood.

Though your Basic language may not support full incremental cursor control, this can usually be emulated by use of the backspace (BS), forespace (or form feed), vertical tab (VT) and line feed (LF). The Ascii code for each is 8 (BS), 12 (FF), 11 (VT) and 10 (LF), respectively. Note these arrow keys on the right side of the terminal. You may be able to use the top or back-

space arrow with your Basic but not the remainder. These keys are software controlled. If you do not have full control of these four keys, then your Basic simply does not support them. To get an idea how one might implement these keys, refer to listing 1. This takes a fairly standard port configuration, examines it for key input, then executes it.

To move the cursor to the home position, use PRINT CHR$(30). If this were to be used extensively, one might set the value equal to a simple string variable, e.g. H$. On the terminal, the "HOME" key will do this.

One of the nicest features about any terminal is the capability to specifically and selectively place the cursor on any available screen position. In the 120, this amounts to 1920 (80 columns by 24 rows) points.

Fairly good screen formatting, albeit cumbersome, can be accomplished by homing the cursor, then executing a series of tab functions and cursor controls. This technique usually has limited use because of the difficulty in moving the cursor through a densely fielded screen without modifying the display. The whole point to this operation is to address the screen so that only portions of it are affected. A far superior method is absolute cursor loading, whereby the cursor is directed to exact X-Y coordinates on the screen.

This fascinating function is implemented by the code sequence of ESC and " = " (Ascii code 61). After this sequence, the next two characters to arrive will be interpreted as the X and Y coordinates. Since the way to send data to the terminal is to print it, direct cursor addressing could be instigated by the statement PRINT CHR$(27);CHR$(61);X;Y. Use a semicolon after the Y value. After having gone to this much trouble to get the cursor to this position, you don't want a CR/LF now. The problem with this statement is the X-Y coordinates. The home position is not obtained by typing 1;1 for the X-Y coordinates. Rather, it is the Ascii value of "space". Position 2 is Ascii code "!", 3 is "'", 4 is "#", and on through numbers, upper and lower case letters. In this form, a meaningful screen grid is difficult to conceive.

Creating an offset

But look at the value of position, "space". The Ascii code is 32. For position 2, it is 33. In fact, starting with position 1 and continuing through to position 80, one finds a consistent sequential numbering of the positions. Unless you are particularly good at cryptographics and enjoy coding such as CHR$(27);CHR$(61);"/";"[", it is much easier to create an offset that will turn your screen into an easily understood grid, with 1;1 representing the X-Y coordinates of the home position.

Probably the simplest way to achieve this is to start with the code we want, i.e., 1, and apply an offset to give the number the terminal will recognize as position 1. Recall that position 1 is represented by a "space" or Ascii code 32. Therefore, (31 + X) should produce the correct result, the offset being 31. If X or Y = 1 then 31 + 1 = 32, the terminal recognized position 1. The whole statement can be constructed as PRINT CHR$(27);CHR$(61);CHR$(31 + X);CHR$(31 + Y);. Now it is possible to sit down with graph paper and determine the screen format, without aimless trial and error. Note that this expression cannot be concatenated in full because of the assignment of X-Y coordinates. Use it as a subroutine with the X and Y values given just prior to executing the GOSUB. Any input or print will now occur at the assigned position.

When it appears that a particular screen format is going to be held on the CRT for long periods of time and that particular fields must be accessed during this time, one can consider field protection.

The most obvious occurrence is that the protected writing is at a lower brightness (i.e. half-intensity) than the normal screen. This helps reduce burning of the screen illumination material and sets out the data being entered following the protected prompts. The protected areas cannot be typed over unless the terminal is first removed from the protected mode. This prevents inadvertent disturbance of critical screen areas. Refer to listing 2 for the code sequence. It is possible to address these routines either as subroutines or as concatenations. The latter is easier to handle and is to be preferred.

The technique for setting up a write-protected screen is straightforward.

The technique for setting up a write-protected screen is straightforward. First, turn the PROTECT ON by typing PRINT CHR$(27);"&". This will automatically set the cursor to home position and sensitize the terminal to accept the START WRITE PROTECT command. Once this is done, you may mix protected and unprotected printing, remembering to start the write-protect only immediately before needing it. It is usually possible to include the command in the same print statement as the prompt to be protected. Then enter END WRITE PROTECT immediately.

If the machine is left on and other printing is done, including some print statement, the spaces and lines in between the obviously protected fields will also be protected and therefore inaccessible. This could complicate matters if you decide to use several different protected fields on the same line. So it is simply a matter of starting the mode, including the prompt to be protected, then ending the mode. When the screen field is properly formatted, turn the PROTECT OFF with PRINT CHR$(27);"'". Ascii code for "'" is 39.

All of this is easy to discuss but somewhat harder to actually put into effect. It is mainly a matter of getting used to working with these various modes. The programmer should probably start any program development with variable assignments similar to the examples. These give the programmer immediate cursor addressing power. Don't wait to include them as an after-thought. Put them at the front and take advantage of this intrinsic terminal power from the beginning. If later it is found that some commands are not used, they can be conveniently deleted to save some memory.

As a start, inspect the program listings 3 and 4. These utilize most of the functions discussed and are mostly involved with screen formatting. No logic is supplied to deal with the data being solicited. The purpose is to explore ways of setting up such a format that can be adapted to other situations later. From here on, only your imagination is the limit.

Listing 3 is a personal data program designed to gather information about a person. The cursor controls are assigned between lines 40 and 180. Absolute cursor loading is in a one line subroutine at line 200.

The first action is to set up the screen beginning with line 220. Note line 250. There is a space between Q4$ and "2. Address". This is the same as Q4$;"2. Address". MBasic allows this configuration but you might need to copy the program, inserting the semicolon where a space occurs between string variables and/or string literals.

Line 340 "HOME"s the cursor. But it is not at home position. This is because this and succeeding positions are protected. The first unprotected position occurs after the prompt in line 240 (which has already been executed to the screen). Before each LINE INPUT is an erase line. Since direct cursor loading is not being used here, some experimenting was necessary to get the cursor on the right line at the right time. The U1$ (up cursor) command was used to step up one line. More important than the program's efficiency at this point is its effect.

The remainder of the program merely formats a print routine for the screen. Line 710 starts the birthday routine which is looking for 5 or 6 digits. If only 5 are entered, a zero is placed to the front of the data, expanding it to six characters. Line 740 puts telephone numbers into standard form, based on 7 or 10 (including the area code) digits. The 7 digit or 10 digit number is entered in the input section as digits without any spacing or markings. The program places those for you.

Display routine included

Listing 4 forms a screen for input of a checking routine. There is really no logic attached to the program. It is just a display routine. The program uses absolute cursor loading extensively for the data input section. The subroutine in line 200 initiates this feature. Several other requisite data inputs are used. For example, one must put in a date before any other data are entered. This is because of the importance of the date of transaction to the account file. One can bypass this feature by simply typing a "*". The remainder of the program is then concerned with inputting data and depositing it to the screen. One interesting feature is the sliding cursor subroutine in line 330. This clears the line prior to inputting new data by rolling a series of periods across the data area. This is probably more for show than function, but it adds an interesting mannerism to the program.

Perhaps the most important aspect of this kind of screen formatting is experimentation. The cursor, at first, will appear to defy all logic. But after the programmer has structured it, such formatting logic should become second nature.

In both program examples, the expression STRING$ is found. This is a command in Microsoft MBasic that prints a series of characters as indicated by the arguments. Lacking this ability, one may use a FOR... NEXT loop to create the same effect. For example, line 660 of listing 3 could be written as follows:

```
660 PRINT Q4$;:FOR X =1 TO 50: PRINT "-";:NEXT X
```

Though not every program will need this much effort, it is obvious that proper screen formatting will increase program clarity and organization. □

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CIRCLE INQUIRY NO. 36

60K bytes of DMB6400 in a North Star Computer

by Alan R. Miller

The DMB6400 memory board by Measurement Systems & Controls, Orange, CA, was reviewed in IA Feb 81. This S-100 board contains 64K bytes of dynamic memory. It utilizes the 4116 16K-by-1 bit chip that can operate at a speed of 4 MHz. The board is divided into four 16K byte sections that can be individually disabled by the phantom line or by an on-board switch. It was designed for use in multibank applications, where memory selection in 16K byte blocks is suitable. However, the board is sometimes utilized as the primary memory for S-100 systems, although a similar product, the DM6400 is better suited for this purpose.

We recently purchased a North Star Horizon computer that arrived with the DMB6400 memory board. The North Star disk controller is memory mapped, requiring access to the 2K byte memory region from E800 to EBFF hex. In order to avoid a memory conflict, the supplier had disabled the entire upper 16K block of the DMB6400 board. This is the region from C000 to FFFF hex. Initially, we added two 4K memory boards to fill in part of the missing region. This allowed us to run a 56K byte CP/M system.

We then discovered that it is relatively easy to disable a 4K byte portion of the DMB6400 board, making the additional memory boards unnecessary. In particular, the memory range E000 to EFFF hex, containing the block required by the North Star disk controller, can be deselected.

Each of the four 4K memory regions of the top 16K byte memory bank utilizes the four address lines A12, A13, A14 and A15. The corresponding addresses for these regions are:

A12	A13	A14	A15	Address
1	1	0	0	C000-CFFF
1	1	0	1	D000-DFFF
1	1	1	0	E000-EFFF
1	1	1	1	F000-FFFF

By decoding these four signals with a four-input NAND gate, the memory board can disable itself when a selected 4K block is addressed. The output of the second NAND gate disables the memory through the phantom bus line.

A 14-pin DIP socket was soldered into the unused location designated as U33 on the DMB6400 board. A 74LS13 4-input, dual NAND Schmitt trigger IC was installed at this point. (A 74LS20 IC can also be used, but it will not provide as much noise immunity). The first NAND gate was used to invert the signal from address line A12. The inverted A12 signal and bus signals for address lines A13, A14, and A15 were connected to the inputs of other NAND gate. The resulting output from the second NAND gate is low when A12 is low and when A13, A14 and A15 is high. It can be seen from the above table that this corresponds to the address range E000 to EFFF hex. The output from this NAND gate is sent to the phantom disable line.

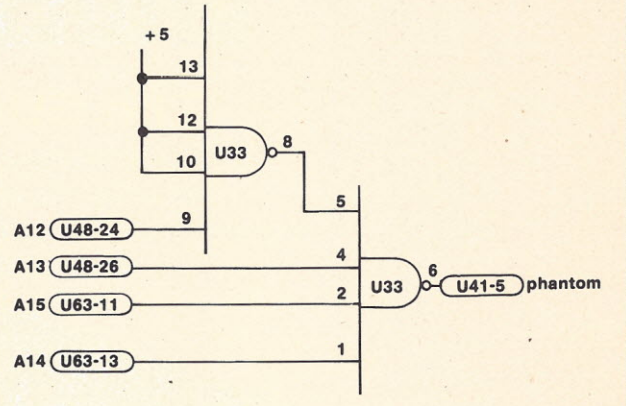


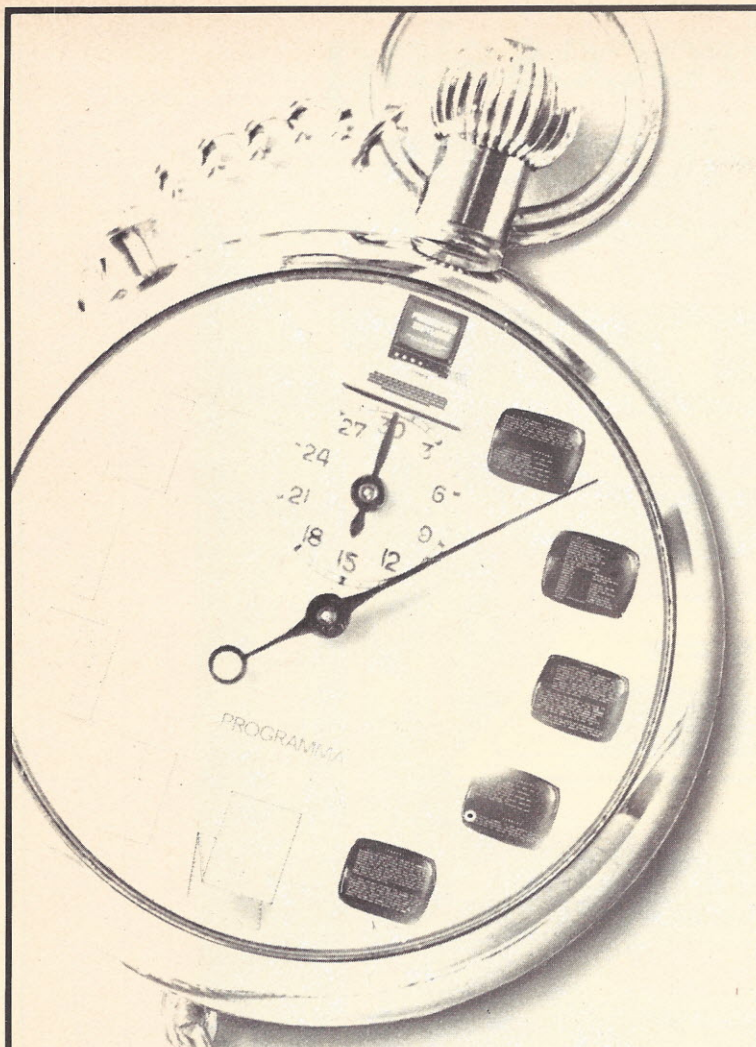
Figure 1. Circuitry to disable the memory block E000 to EFFF hex.

A schematic of the added circuitry is shown in figure 1. Since the 14-pin socket is soldered into a 16-pin position, you must be careful to jumper the ground line from the original pin position 8 to the new pin position 7. The unused inputs for the second NAND gate are pulled high by connecting pins 10, 12 and 13 to pin 14. This can be accomplished by soldering a bare wire along the adjacent legs at the underside of the board. Pin 11 is not used on this IC, and so the connecting wire can touch at this point.

A short wire on the underside of U33 is used to connect pin 8, the output from the first NAND gate, to pin 5, one of the inputs to the second gate. Longer wires are used to make the other connections. These, too are placed on the underside of the board.

At the conclusion of the operation, be sure to switch on the top bank of memory. The result will be a contiguous block of memory from address zero to DFFF hex, allowing room for a 56K byte CP/M. In addition, a 4K byte block of memory that can be used as a scratchpad area will be available from address F000 to FFFF hex.

It appears that the contiguous memory region, E000 to E7FF hex, just below the disk controller, can also be made available. A 58K CP/M system could then be used. The procedure is more complicated in this case however. The address line A11 will have to be sensed in addition to A12, A13, A14 and A15. There are several unused NOT and NAND gates on the memory board that can be used for this purpose. □



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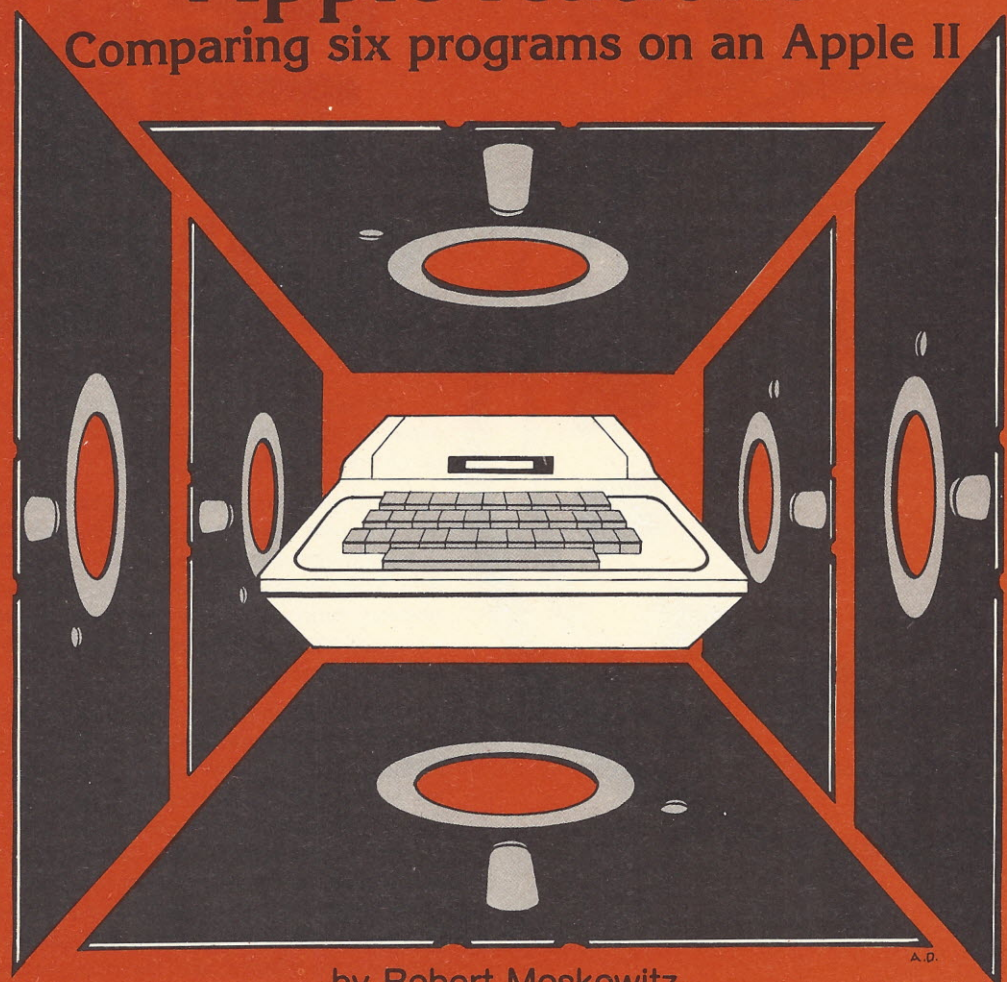
Word Processing Apple-ications

Comparing six programs on an Apple II



by Robert Moskowitz

The move up from a typewriter to a computer is like the move from a bicycle to an automobile: it extends your range of action, your freedom of movement and your ability to accomplish more things in less time. But it's tough for a novice to evaluate the nuances and differences between available programs. Most people who purchase computers for word processing are forced to make naive choices. They are thinking about hardware more than software. A word processing program is not usually tested on any serious work. You just fool with it, like playing Chopsticks on a grand piano, to test the action. So the intricacies and subtleties of each word processing program escape you.

The following comparative evaluation of six popular word processing programs is based on a thorough investigation of their capabilities, discussions with people who use them, and actual writing time. The programs, all tested on an Apple II, include: Apple Writer ($75, Apple Computer, Cupertino, CA), Easywriter Professional ($250, Information Unlimited Software, Berkeley, CA), Magic Window ($100, Artsci, Inc., N. Hollywood, CA), Super-Text ($150, Muse Software, Baltimore, MD), Word Processing System ($130, Programma International, Burbank, CA) and Write-On II ($150, Rainbow Computing, Northridge, CA).

Each program is commercially successful and has a loyal core of adherents who swear by it and downgrade every other. Each offers positive and negative features: trade-offs that make it impossible to point to any one of them as the "best." Some are great for creative writing, but unsuitable for columns or tabular material. Others work wonderfully for columns and tables, but not for heavy re-writes or editing. Most have a neat feature or two uniquely their own, but also a decided disadvantage as well.

Word processing programs must mesh with both the creative processes (like thinking, writing and editing), and tedious manual processes (like keying in words and numbers from hard copy sources). The users' brain patterns, habits, perceptions, and thoughts are the dominant factors in liking or not liking a program. If a program suits your brain patterns, it will enhance, rather than interfere with, your ability to work. If a program doesn't suit you, you won't like it as much. This is my explanation for why otherwise intelligent people swear by a program I find obnoxious, and vice versa.

General capabilities. All six programs share basic capabilities, although they require different key sequences and different steps to accomplish the same tasks. Standard capabilities include:

- clearing computer memory space
- entering text
- saving files to disk memory
- loading files from disk memory
- inserting new material into files from keyboard or disk
- modifying existing text
- finding and/or replacing characters
- deleting material
- moving material around in a file
- cataloging the disk
- printing files

Program differences. One noticeable difference is the means of marking off text blocks for moving, copying, saving or deleting. The easier way is to insert simple one-character markers at the start and end of a block, then to delete it, save it to disk, or position the cursor where you want the block sent. Easywriter and Super-Text use these markers and allow you to mark off as much text as you like.

The clumsier way, a la Apple Writer, is to set off the block with marker text. Here you must give the computer a character sequence to find and use as the start of the block. The cursor marks the end. In a long file, this is a tough chore. You may have to hit three, four or a dozen keys to specify a unique sequence. And if the block extends off the screen, you can't copy the opening sequence. You have to remember it. This extra typing and thinking takes you away from your thought process and forces you to pay attention to the mechanics manipulating text. In word processing circles, that is very undesirable.

The middle ground of block actions is to put the lines you like into a special buffer, then to pop them out again where you want them sent. Magic Window and Word Processing System do it this way. They are limited to 16 and 21 lines, respectively, and by the need to move a whole line. Write-On II also insists on moving whole lines, but has no limit on block size.

Block saves are closely related to block moves. The idea is to select a portion of your text and put it to the disk in its own file. With some of these programs, you first save the whole file, then delete the unwanted portions and save what is left. A better way is to be able to save a block of any size directly to the disk. Block copying and deleting are other useful functions, that all of the programs handled quite well.

Some of these programs use a "protected" DOS, some do not. You aren't supposed to be able to make your own copies of the protected program disks. However, most of them put out normal Apple data disks. You can conveniently back these up with any single or dual drive copy routine. Super-Text is the exception. Even its data disks use a protected DOS, and you must use its own two-drive copy routine to back up your data disks.

Most of these programs are line oriented: they count lines, consider lines to be units of text, and may force you to insert or delete material a line at a time. Easywriter and Super-Text are character oriented. This means that they make no special bones about screen lines of text. They will automatically move words up and down between lines as you insert and delete material. They allow you to insert new material directly into the middle of a line, without any special text manipulation. The other programs require you to accommodate their fixations with screen lines of text by breaking a line or otherwise manipulating the material.

Some will accommodate only 10K of active memory, others run to 20K and 30K. To help you judge their capacities, figure on about 1200-1500 characters per double-spaced typewritten page. In general, the programs slow down as memory gets full, too, so you are practically limited to 50% or 75% of the rated file size. Two programs get around their file size limitations by allowing you to link files on the disk for editing. The computer then takes care of automatically saving one file and loading the next as you search, change, replace and rewrite. Easywriter does this quite rapidly; Super-Text can take up to 20 seconds to complete an automatic link from one file to another. The other programs can't do this at all while editing; most will allow you to chain files for printing.

Integrated programs offer a more efficient method than the modular system. For example, Easywriter loads in its entirety—once booted, it performs all its functions from memory, and goes to the disk only for file saves and loads. Super-Text is the same, except for its math function, which resides in a special module on the disk and must be loaded to be used. All other programs load only an editor module, then must switch to a printer or formatter module when output is needed.

Most of the programs show you a standard Apple catalog of the disk. Magic Window shows only ten file names at a time. Super-Text and Easywriter have special directory formats to display all files on a disk in one screenful or material. These two are the only ones to allow file saves and loads by number, a convenience feature which saves much typing and time in actual use. Easywriter also shows file sizes and remaining disk capacity with the disk directory.

Integrated programming offers a more efficient method than the modular system...

All of the programs seem to provide about 85K character storage of characters in multiple files. While standard Apple 13 sector disks should hold 103K characters, the difference is probably due to track/sector lists and other housekeeping information stored with each file. The exception is Easywriter, which seems to store about 98K of characters on a disk.

The need to re-enter words and phrases varies markedly. Apple Writer, for example, requires character sequences for block markers. Write-On II requires character sequences extensively to identify and initiate both major and minor changes to the text. Both programs consequently require a lot of re-typing. Magic Window, Super-Text, and Easywriter, on the other hand, are almost totally command controlled. That is, once you enter the characters of the text, one to three command keystrokes will move them, delete them, copy them, save them, and manipulate them in many

Table 1. Comparison of features

CODES Y = Yes (" " = No) N = Normal F = Fast M = Medium speed S = Slow L = Line C = Character W = Word O = Optional P = Paragraph T = Screen (Tube) H = High U = Usual	W/P System	Easywriter	Super-Text	Apple Writer	Write-On II	Magic Window
Uncopyable Program Disk		Y	Y			Y
# Command keystrokes						
min	1	1	1	1	1	1
max	6	3	3	4	3	5
Memory size (in K)	21	11	19	31		32
File size counter	W	W	C	C		
Orientation	L	C	C	L	L	L
Confirmations	Y	Y	Y		Y	
Print to screen		Y	Y			
Formatted display		Y	Y	Y		Y
Response to shift mode	Y	Y	Y		Y	Y
Typing speed	F	M	F	F	F	F
Mode change speed	S	M	M	F	M	F
Command executions speed	S	S	F	F	M	F
Scrolling — vertical	Y	Y	Y	Y		Y
horizontal	Y	Y				Y
Search/Replace	Y	Y	Y	Y	Y	Y
Bi-directional		Y	Y			
Insert from disk	Y	Y	Y	Y	Y	Y
Partial save	Y		Y	Y	Y	Y
Block moves	Y	Y	Y	Y	Y	Y
Speed	F	M	F	S	S	F
1 Char. marker		Y	Y			
Large capacity		Y	Y	Y	Y	
Deletions: Block	Y	Y	Y	Y	Y	Y
Char	C	C	C	C	C	C
Word			W	W	W	
Line	L	L	L	L	L	L
Paragraph				P		
Screen	T		T			
Whole Memory	M	M	M	M	M	M
Catalog disk	Y	Y	Y	Y	Y	Y
Disk load/save by #'s		Y	Y			
Insert from keyboard	Y	Y	Y	Y	Y	Y
Auto wrap	Y	Y	Y		Y	Y
Auto wrap (optional)	Y	Y	Y	Y		O
Disk storage density	N	H	N	N	N	N
Ditto capability	L		Y		L	C
Math capability			Y			
Prints page numbers	Y	Y	Y	Y	Y	Y
Prints headings	Y	Y		Y	Y	Y
Form letter	Y	O			Y	O
Split screen			Y			
Copy routine for back-up	Y	Y	Y	Y	Y	Y
Command menus		Y				
Command prompts	Y	Y	Y	Y	Y	Y
Neat features	1	2	3	4	5	6

1. Left/right shift of material; Works with many binary/text files
2. 80 column display; Help menus on screen; Super fast disk access; Displays disk space "% used"; Sideways scrolling, no limit
3. Special keys: ditto, "the"; Split screen display capability
4. Will capitalize or knock down an entire block of text with one keystroke
5. None
6. Fast, graphic menu system

ways without need to re-enter them. You must key in characters only if you want to overwrite existing ones. Word Processing System doesn't require re-keying character sequences, but its commands often require up to 7 keystrokes or more. In heavy use of a word processing program, the number of keystrokes required and the frequency with which you must re-enter characters become major factors.

All come with usable documentation. Write-On II and Magic Window take you through a learning process in their manuals, and it's a little difficult to go back and look up specific keystrokes or capabilities. Word Processing System has a tutorial section, and also provides an encyclopedia of information about the program. You can usually find what you want when you need it. This manual is clearly the most detailed and complete, including such esoteric information as how to move the command keys around the keyboard to suit your fancies. Easywriter, Super-Text and Apple Writer provide straightforward narratives that describe the various functions of the programs. These are readable, and also easy to reference. With Easywriter's on screen menus, though, its manual is almost superfluous.

Table 2. Capsule evaluation

CODES E = Easy M = Medium D = Difficult G = Good S = Slow Other codes from Table 1 apply	W/P System	Easywriter	Super-Text	Apple Writer	Write-On II	Magic Window
Ease of Use	E	E	E	E	E	E
Ease of Learning	D	M	M	E	E	E
Similarity to typewriter	M	G	G			G
Documentation quality	G	G	G	G	M	G

Program notes. Apple Writer is a minimal word processing program. Although the commands are relatively easy to use, the display is difficult to get used to. This is the only program in which the cursor takes up a space on the line. When you move the cursor onto a line, characters shift one space to the right to make room for it. When you move it off the line, they shift back.

As it comes from the factory, it displays capital letters as inverse on the screen. Those with the Dan Paymar lower case adapter can write to him for a simple patch to make the program display upper and lower case. This patch makes the program better, but there are still some problems.

The big drawback is the wrap-around. Instead of moving an entire word to the next line when you run out of room, this little program moves one letter at a time. The result is a confusing display of broken words that are hard to read. The print routines put the words together again, but the editing process is unnerving to watch.

Block moves are done using temporary disk storage. The block you select is put to the disk, then recalled when you have told the computer where you want the

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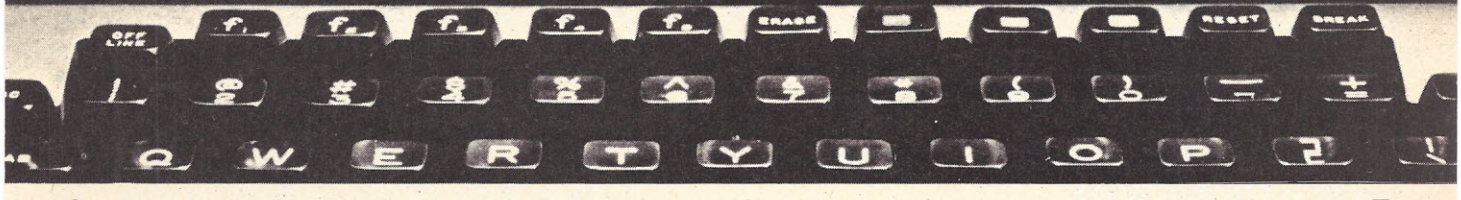
```
REM  MERGE SORT USING LINK () FOR INDEX
FUNCTION     MERGE (I,J=INTEGER)=INTEGER
          VAR T,KM,M=INTEGER
          IF ARRAY (I) <ARRAY (J) THEN
               BEGIN
                         M=I
                         I=J
                         J=M
               END
          T=I
          KM=T
          I=LINK (I)
          WHILE I<>0 DO
          BEGIN
               IF ARRAY (I) <ARRAY (J) THEN
                         BEGIN
                                   M=I
                                   I=J
                                   J=M
                         END
               LINK(KM)=I
               KM=I
               I=LINK(I)
          END
          LINK(KM)=J
          END=T
FUNCTION     SORT(IS,JS=INTEGER)=INTEGER
          VAR KS,II,JJ=INTEGER
          IF IS=JS THEN
               BEGIN
                    LINK(IS)=0
                    RETURNED VALUE=IS
                    GOTO 0END
               END
          KS=IS+((JS-IS) 2)
          II=SORT(IS,KS)
          JJ=SORT(KS+1,JS)
          RETURNED VALUE=MERGE(II,JJ)
0END      END=RETURNED VALUE
```



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insertion. The use of the disk slows down the process, although it neatly side-steps the limitation on block size that some of the other programs have.

Easywriter - Professional System is closely related to the popular and very useful WordStar program. It has the same on-screen help menus, on-screen tabs and margins, and many other identical functions. In addition, it is the only program in the group using an 80-column board (in this case the Double Vision from Computer Stop, Torrance, CA was used). It displays a full width letter or manuscript and formats the screen to match what the printed version will look like.

It functions very well and is most impressive in its disk access and usage. For example, disk access is very fast for catalogs, loads and save. Files can be loaded and saved by number instead of name. In addition, it stores about 20% more information on its disk than the other programs, although some of the programs converted to a 16 sector DOS might do as well.

The program allows direct access to the text through simple cursor moves and command keystrokes. In use, you soon forget it and concentrate on your work. It is easy to use and powerful enough to be a very big help.

The major problem seems to be command execution speed. When you type moderately fast, for example, the screen lags a few seconds behind. While disk loads and saves are fast, the program waits several seconds after loading a long file before you get a display. You get the same wait for most other commands as well: moves, deletions, scrolling and changes to on-screen tabs and margins.

Another factor is the hardware. An 80-column board is needed and (most likely) a monitor to run it. A fan is essential for cooling. This brings a constant whispery fan noise to your work room, and makes it more expensive to get up and running.

Magic Window is a very fast, easy to use program that is markedly different from the others in the group. Most programs display text and allow the cursor to move around on the screen. But the Magic Window has a fixed cursor, smack in the screen center. The text is on a scroll of imaginary paper that you move left and right, up and down, behind the cursor. It's sort of like reading a newspaper by fixing your head and eyes on one position, and moving the newspaper around at arm's length to eyeball various parts of the page.

The idea is for the program to recreate a typewriter, where the paper moves back and forth in front of the keys. The keyboard can also be set to make a ticking sound to enhance the typewriter feeling. But I had a hard time reading anything written on 65 character or longer lines. With tab stops set, as recommended, the text pops back and forth and my eyes had a difficult time finding the place to continue reading. You can also read as you scroll the text sideways, then pop it back to the left for the next line.

The program is good because it allows you to see exactly what you will print out, right on the screen as you go—including line indents, paragraph spacing and page breaks.

The best parts of this program are the menus. The main system menu displays a choice of editor, formatter, filer, configuration and printer subsystems, plus an exit to Basic. You use the arrow keys to position a bar of light over your choice. Hitting Return energizes the selection. The same pattern repeats in every sub-

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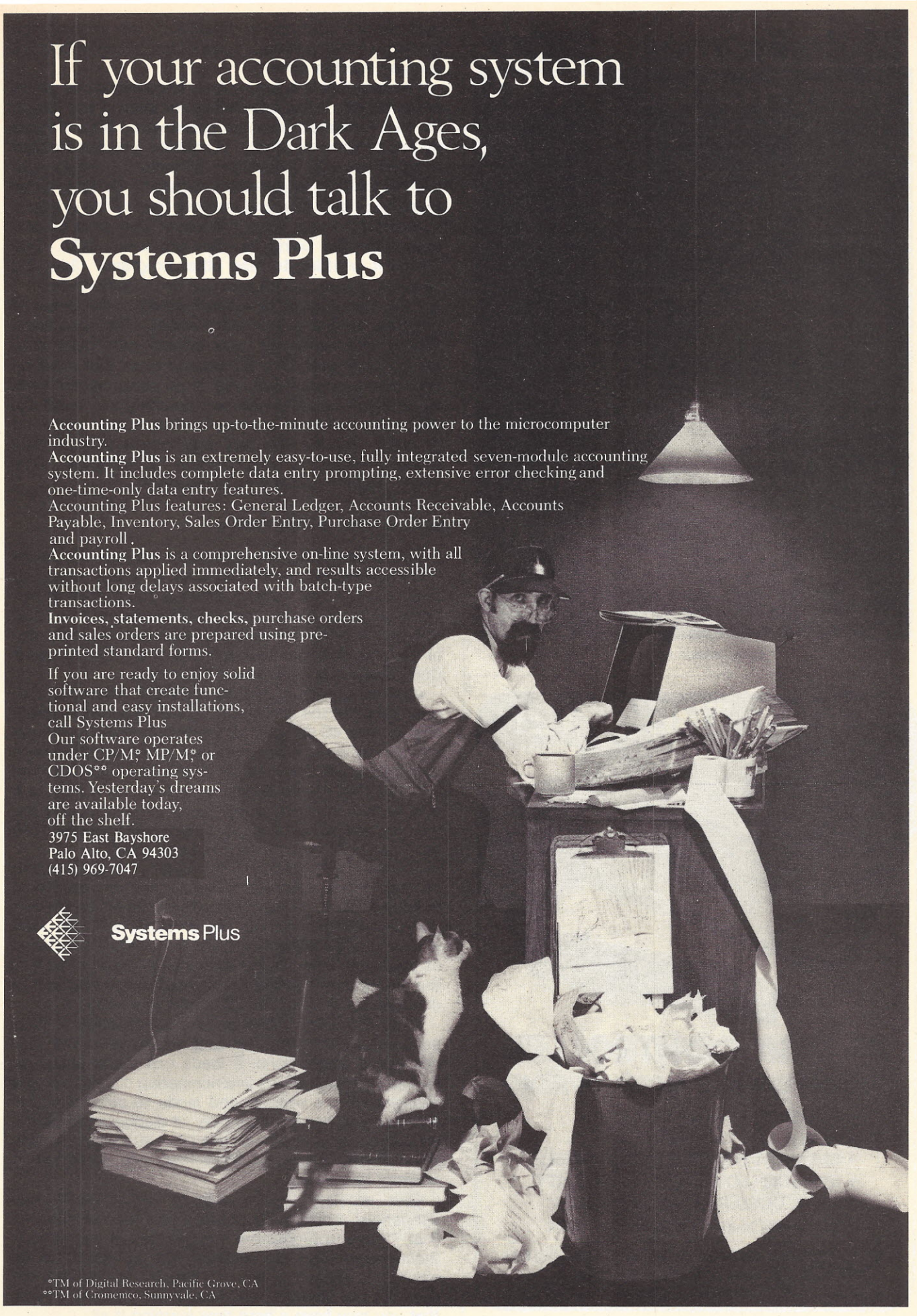

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system, and each menu defaults to the main branch setting, so hitting Return three or four times will always get you into the editor.

The program is lightning fast, and seems one of the most flexible. It has capabilities for loading and saving its own formatted files and unformatted files created by this program or others. In addition, you get detailed suggestions and guidelines for writing a Basic subroutine that will enable the program to do form letter merging of disk files and memory files to the printer.

Super-Text is a word processor that runs on and saves its files using its own protected DOS. This makes it unwilling to read other programs' files, and requires you to use its own two-drive copy routine.

Also, the program is not well suited to the layout of columns across a full width sheet. The 40-column display with automatic wrap-around gets quite confusing when you have 80 column rows that must be precisely aligned. I was able to do some column work by putting in lots of spaces and counting very carefully. Still, other programs are much better suited to this sort of work. Yet it's the only one with a special math module, including four-function accumulator, item count, column add and column justify.

Split screen is impressive

This program actually seems to convert the Apple into a full featured word processor. One very appealing feature is the split screen, allowing you to look at two different parts of the same file in memory at one time. You can refer to an outline, for example, as you write, or you can compare two versions of a letter to see if there are subtle differences in wording.

Another interesting feature is PVIEW, where the program prints to the screen as it would to a printer. It will display only 40 columns of the final printout, although any 40 you wish. This allows you to see exactly where your pages will break and to check that your columns and such will line up as you want them to. It may take four or five previews to get the document looking the way you want it, but it is much faster and cheaper than repeated print-outs to get the same result.

But first and foremost, the program is a word processor. A few simple commands control insertions, deletions, block moves, file loads and saves to the disk and formatting print-outs. As a result, you can start writing very quickly and learn its more detailed features as you need them. The program takes care of much of the business of running the computer, allowing you to concentrate on your thoughts and your work.

Word Processing System is a combination of text-editor and print-formatter that works very well in a number of applications. It loads and saves binary as well as text files, offers line numbering capabilities and changes from a wrap-around mode to strict line-at-a-time entry. It has the capability of displaying full width 80-column lines and does this on a 40 column screen by switching back and forth from one screenful of memory to another.

One problem is the amount of extensive key sequences required. Sometimes you need as many as 6 or 7 keys to trigger the desired task. It seems as if these keystrokes are ordering the computer to do something instead of doing it directly. In addition, the system does so much, and has so many sub-functions, that you may have a hard time learning it all.

Another problem is the formatter, which changes what you see on the screen to conform to your keyed in output commands. It's not always easy to know what format you'll get just by seeing what's on the screen.

In general, it's a good, flexible text-oriented tool which will do much more than word processing, but will not do that as well as a more specialized word processing program.

Write-On II is a functional program that removes you from your text more than any of the other five. Once you stop keying in text, you work in an editor mode that doesn't let you work on text directly.

The program provides a screenful of text and a command line. Instead of moving the cursor around, you use cursor positioning commands only to get to the line you want to edit. Then you use the search and replace function to remove strings of characters in favor of corrected, expanded, or diminished replacements. For more extensive changes, you break the line and start inserting new material. The program does not offer true scrolling, but instead clears the screen and, after a moment, shows a new section of text. It makes block copying easy and will work on a wide variety of text and data files made by this program or by others. It will also do form letters, as is.

In looking at these programs, it's clear that there are remarkable differences in how they act, how they feel, and how much they facilitate and enhance the user's ability to work with words. As the tables show, the similarities are much more pronounced than the differences.

Write-On II and Apple Writer are functional programs only. They will accept keyed in characters, perform simple manipulations on them, load and save to disk and print files. But they are by no means sophisticated word processors. It takes concentration and skill to operate them and that takes away from the creative and refining process.

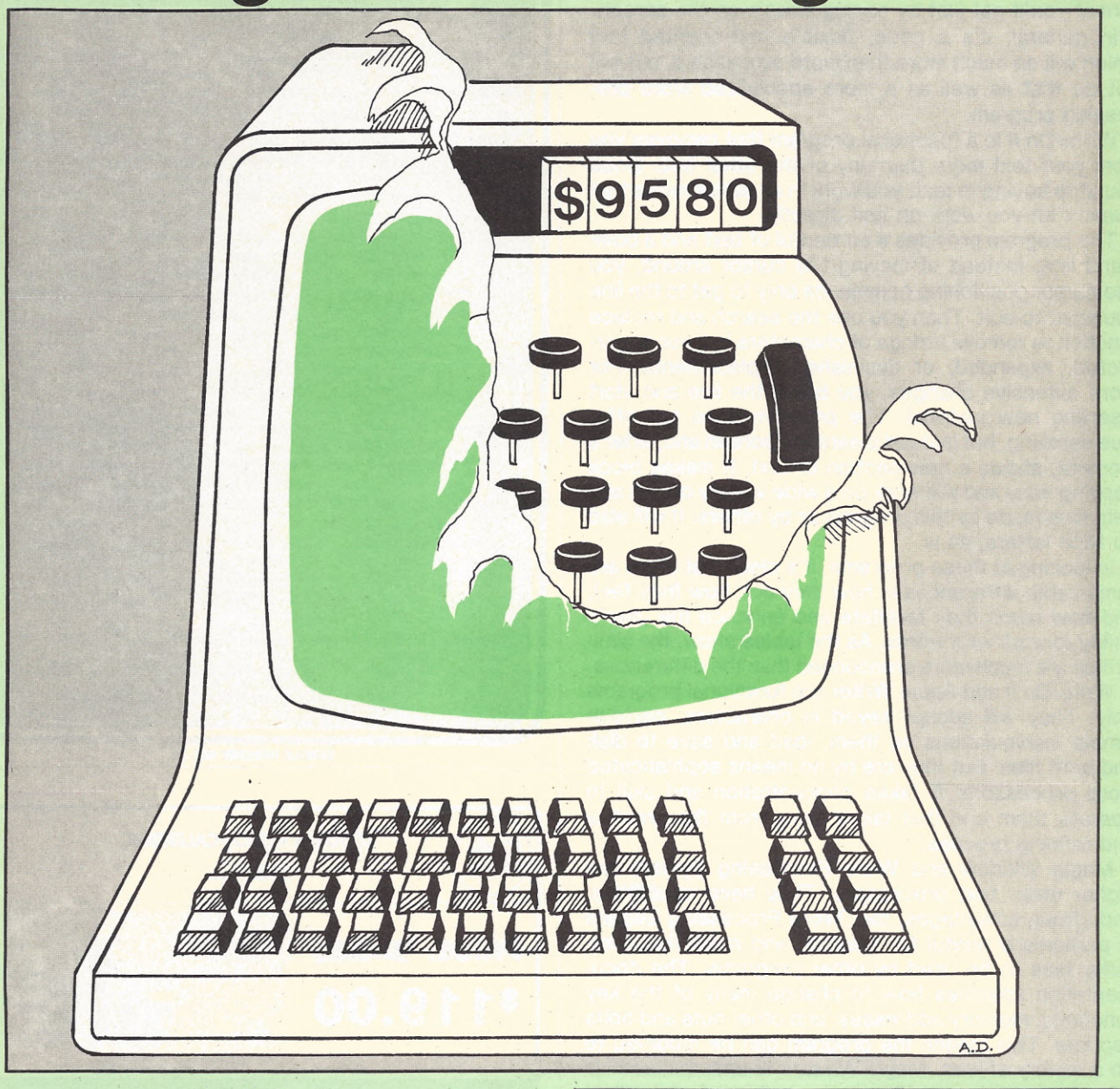
Magic Window and Word Processing System are higher order text processors. They have disabilities, and strong advantages, too. Word Processing System is particularly useful for creating and modifying computer files to be used by other programs. The documentation specifies how to change many of the key functions, memory addresses, and other nuts and bolts aspects. This means the program can be modified to do a variety of jobs. Magic Window is unsurpassed for 80-column work on a 40-column machine. And it will do a number of writing and editing jobs quite well.

Two systems stand out

Easywriter and Super-Text were clearly the most efficient of the bunch. Both offer sophisticated features, ease of access to the text, and rapid command execution. The result is a transparent program that lets you believe you are manipulating the screen directly with your fingertips. I find that both enhance my ability to write, and later edit, what I want. They go as fast as my thoughts, taking no time or effort away from my concentration.

The main difference is 80 + columns vs. 40 columns and cost. Super-Text, after all, runs on a basic 48K Apple using any TV. Easywriter needs an 80-column board, which needs a monitor. Super-Text can clearly be recommended for just about any manuscript application, and Easywriter for anyone with more money to spend, or who needs 80 columns of display. □

Coding and Decoding Prices



by Jim Schreier

Many businesses find that it is helpful to code some of their prices, especially when confidential lists are taken into the field. This offers a certain measure of security. But even with only a few coded prices, the preparation of such a list is slow and awkward. Each price must be translated into the code, checked, double-checked, and, when needed by the salesman, re-translated back into the price. Such a system can produce mistakes, resulting in lost profit.

This program will simplify the process. If the correct number or code is entered, the results are both accurate and many times faster than the laborious manual translations. CODE.BS uses the code key BLACKSTONE. Other keys, such as LUMBERJACK, are possible. The key should be ten letters in length, with one being the first letter and zero the last letter. No letters may be repeated. The key need not be a word. Random letters may be used. Personnel in the field, however, may have more difficulty with random

The program as printed currently defaults to the code key, BLACKSTONE which represents numbers one ("B") through zero ("E"). Zero will always be the last letter. This figure changes the code key to LUMBERJACK. Other codes may be used as you wish.

```
LINE    CURRENT VALUE          NEW VALUE

  90    KY$="BLACKSTON"        KY$="LUMBERJAC"
 290    B$(X9)="E"             B$(X9)="K"
 410    J$(AB)="B"             J$(AB)="L"
 420    J$(AB)="L"             J$(AB)="U"
 430    J$(AB)="A"             J$(AB)="M"
 440    J$(AB)="C"             J$(AB)="B"
 450    J$(AB)="K"             J$(AB)="E"
 460    J$(AB)="S"             J$(AB)="R"
 470    J$(AB)="T"             J$(AB)="J"
 480    J$(AB)="O"             J$(AB)="A"
 490    J$(AB)="N"             J$(AB)="C"
 500    J$(AB)="E"             J$(AB)="K"
```

Figure 1. Changing the key

letters. The program assumes BLACKSTONE. Altering the key requires 12 changes from the printed listing (see figure 1).

Use of zero

The program is really an advanced subroutine. It makes an extensive use of the MID$ feature, so your Basic must be able to support string manipulations. Using strings (meaning a collection of unique alphabetical characters rather than numbers) simplifies the approach, but leaves one stranded in coding the number zero. For this reason, zero is handled as a special case (see line 290).

Up to 20 digits may be entered for coding or decoding. All references in the body of the program are to the variable Z which is set in line 70. Different Basics may allow more or less than 20 digits at this point. Adjust the variable Z to meet your needs.

This program makes use of some unique FLEX disk operating system and TSC's extended disk Basic features. These features have nothing to do with the program. You can skip them, or adapt them to your hardware/systems software. The EXEC command (line 30) calls a utility command that will disable the terminal width control. CHR$(12) clears the screen and homes the cursor. Some intelligent terminals allow the option of dual intensity letters. Lines 610-660 will print a low-intensity message, reversing back to regular intensity as the program continues. Any of these features may be omitted. □

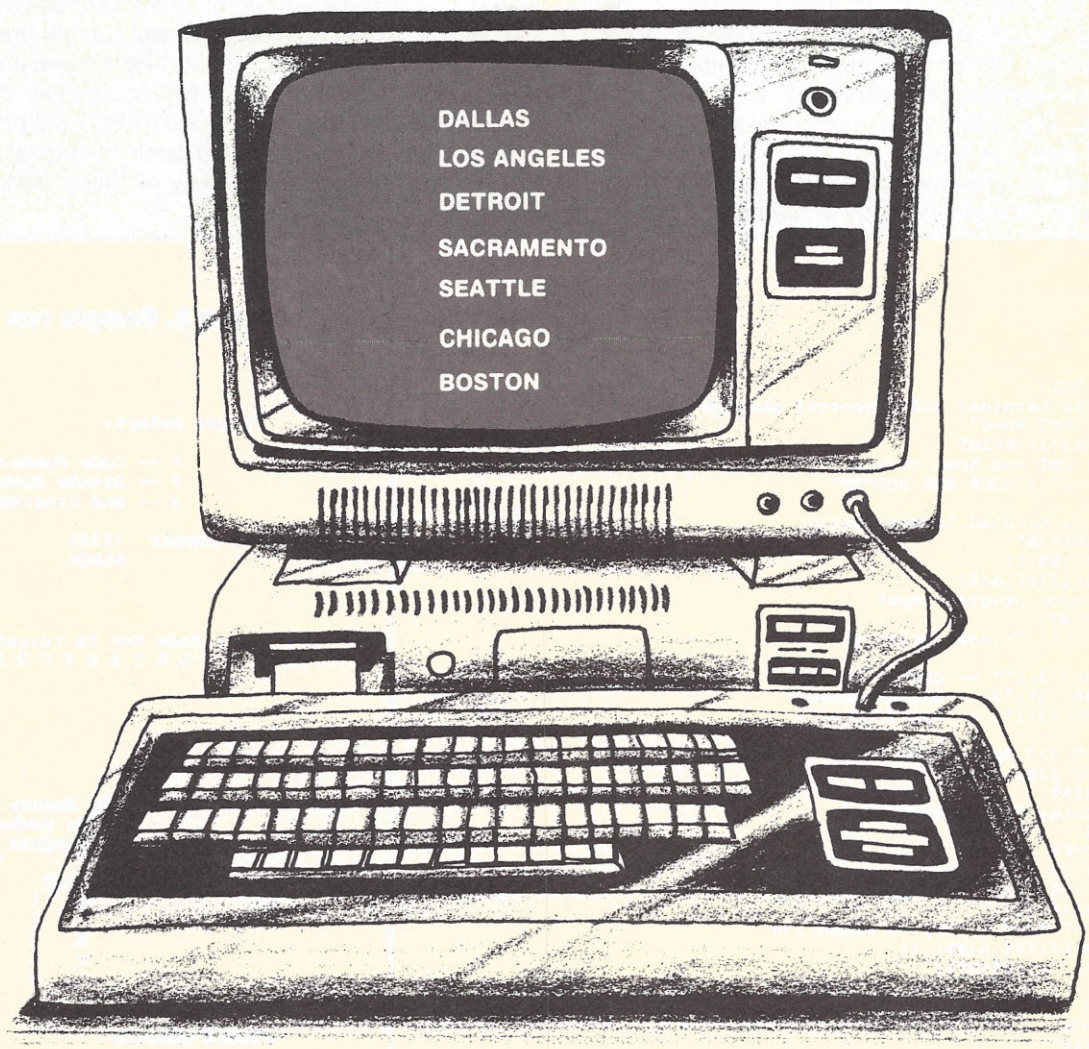
Listing 1

```
10 REM CODE.BAS
20 REM Disable terminal width control through DOS.
30 EXEC, "TTYSET WD=0"
40 PRINT CHR$(12):PRINT
50 REM Clear CRT and home cursor
60 PRINT TAB(21);"CODE AND DECODE"
70 Z=20:N=0
80 REM Zero is handled independently.
90 KY$="BLACKSTON"
100 DIM A$(Z),B$(Z)
110 DIM J$(Z),J(Z),A(Z)
120 REM Commence program input
130 PRINT:PRINT
140 PRINT TAB(6);"Please Select:"
150 PRINT
160 PRINT TAB(13);"1 -- Code Number"
170 PRINT TAB(13);"2 -- Decode Number"
180 PRINT TAB(13);"3 -- End Program";
190 INPUT S
200 IF S<1 OR S>3 THEN PRINT CHR$(12):GOTO 130
210 ON S GOTO 220, 340, 560
220 PRINT:PRINT
230 INPUT "Enter The Number",N$
240 N=LEN(N$)
250 IF N>Z THEN 230
260 FOR X9=1 TO N
270 A$(X9)=MID$(N$,X9,1)
280 A(X9)=VAL(A$(X9))
290 IF A(X9)=0 THEN B$(X9)="E":GOTO 310
300 B$(X9)=MID$(KY$,A(X9),1)
310 PRINT TAB(18);B$(X9);
320 NEXT X9
330 GOTO 590
340 REM decode
350 PRINT:PRINT
360 INPUT "Enter Code to Decode",NU$
370 VL=LEN(NU$)
380 IF VL<0 OR VL>Z THEN 360
390 FOR AB=1 TO VL
400 J$(AB)=MID$(NU$,AB,1)
410 IF J$(AB)="B" THEN J(AB)=1:GOTO 530
420 IF J$(AB)="L" THEN J(AB)=2:GOTO 530
430 IF J$(AB)="A" THEN J(AB)=3:GOTO 530
440 IF J$(AB)="C" THEN J(AB)=4:GOTO 530
450 IF J$(AB)="K" THEN J(AB)=5:GOTO 530
460 IF J$(AB)="S" THEN J(AB)=6:GOTO 530
470 IF J$(AB)="T" THEN J(AB)=7:GOTO 530
480 IF J$(AB)="O" THEN J(AB)=8:GOTO 530
490 IF J$(AB)="N" THEN J(AB)=9:GOTO 530
500 IF J$(AB)="E" THEN J(AB)=0:GOTO 530
510 PRINT CHR$(12):PRINT
520 PRINT TAB(13);"> Incorrect Code Entered."
530 PRINT TAB(22);J$(AB);TAB(22+VL-2);J(AB)
540 NEXT AB
550 GOTO 130
560 END
570 REM This routine prints the message using low-intensity letters.
580 REM After the message is issued regular-intensity letters continue.
590 PRINT CHR$(30);CHR$(22)
600 PRINT
610 PRINT TAB(45);"Your Code Key Is Currently"
620 PRINT TAB(49);"B L A C K S T O N E"
630 PRINT TAB(45);"Enter a letter to continue";
640 INPUT Z$
650 PRINT CHR$(30);CHR$(6)
660 PRINT CHR$(12):PRINT
670 GOTO 130
```

Figure 2. Sample run

```
                Please Select:

                     1 -- Code Number
                     2 -- Decode Number
                     3 -- End Program 1

Enter The Number  12345
                  BLACK


              Your Code Key Is Currently
                 B L A C K S T O N E



               Please Select:

                     1 -- Code Number
                     2 -- Decode Number
                     3 -- End Program 2

Enter Code to Decode BLACK
                       B   1
                       L   2
                       A   3
                       C   4
                       K   5


               Please Select:

                     1 -- Code Number
                     2 -- Decode Number
                     3 -- End Program 1


Enter The Number 556743211768
                 KKSTCALBBTSO


              Your Code Key Is Currently
                 B L A C K S T O N E

               Please Select:

                     1 -- Code Number
                     2 -- Decode Number
                     3 -- End Program 3


READY
```

Travel Planner



by David D. Busch

Those of us who are frequent business travelers note that some cities become like old friends. Sales people, service representatives, top managers of corporations might have "territories" or they might have to visit broad areas of the country throughout the year.

In any case, repeated visits to cities allow the business traveler to glean important information The Red Lion Inn might be a favored hotel in Seattle, or Republic Airlines the best way to get in and out of Detroit. A certain car rental company provides sub-par pickup service in Dallas, while the Holiday Inn in Sacramento is scarcely 100 yards from the luggage pickup area at the airport. Efficient traveling calls for a gradual building of this data base, so that the same lessons don't have to be learned all over again the next time that same executive—or someone else from the company—returns to a given city.

The following is a data base management program specifically written to keep up-to-date information about a variety of cities, and print the data out in a form that can be most easily used by a travel agent or other person making reservations when a trip is planned.

Written for a TRS-80 Model I with one or more disk drives, the features include:

1) Data bases that are stored in disk files keyed to the name of the traveler, so if more than one executive uses the program, one may specify a preference for the Ramada Inn in a certain city, while another may indicate the Hilton.

2) The program keeps track of preferred and alternate hotels, and reservation numbers.

3) Car rental companies may also be stored in a separate disk file, and the nationwide toll-free reservation number entered just one time for each. This number is supplied each time a given company is selected by the traveler. In addition, the phone number for pick-up at the airport may be entered for each city.

4) Preferred airlines for getting in and out of a city can be entered.

5) Names of all customer/personal contacts in the city, along with their phone numbers, are stored in another category.

6) Comments or notes on top entertainment possibilities for the city can be optionally provided by the traveler. This last entry can be a special help to new employees of a company visiting a destination for the first time.

7) New cities may be entered at any time, and old ones updated.

The program is divided into four modules, "enter new cities", "set up a trip", "update a city", and "enter new rental car companies."

The cities data is stored in a string array CITY$(row, col), where each row represents a different city, and the six columns contain information on the city name, hotel data, car rental information, preferred airlines, customer contacts, and comments respectively. CITY$(row,col) is loaded with the existing file for that traveler each time the program is run. The user inputs a last name (LN$, line 30), a first initial (FI$), and the rightmost eight characters of LN$ + FI$ used as the file name (N$) for the existing cities file. Radio Shack's disk Basic allows only eight characters for file names (not counting the extension), but the truncation is invisible to the user. Only if a company has two workers with the same last name and first initial could this cause a problem. I'd suggest inputting a first and second initial in response to the second prompt to bypass this. The same name must be supplied to the program on each run, obviously.

Enter new cities. This module begins at line 340. The first step is to call a subroutine at lines 250-320 that lists the cities currently in the file to the screen, so that the user may double-check to see that the new city to be entered is not already in the file.

The number of cities currently in the file is stored in the variable NC. This number is loaded into the program when the user's CITY file is accessed. When new cities are added, NC is first incremented by one (line 370) so that all subsequent input is stored in the next available row in the array CITY$(row,col). The six columns of the array are filled by subroutines listed one after another in lines 380-420. The input modules are treated as subroutines for a simple reason. When the user later wishes to update only a certain portion of the city's data, that input module subroutine can be called from the update portion of the program without the need to go through the other sections, as would be the case if strict top-to-bottom program flow had been followed.

Hotel information

In the first section, the name of the new city is entered and stored in CITY$(NC,1). Next, the favored hotel is input (HT$), and its reservation phone number (PH$) entered. CITY$(NC,2) is given the string value of these two concatenated together (line 490). If an alternate hotel must also be listed, it is entered and stored at the end of the same string. CHR$(13) (printer linefeed), and CHR$(26) and CHR$(29) are used to separate the preferred hotel from the alternate both on the screen, and when the data is printed out. CHR$(26) causes a carriage return to be generated on the screen, while CHR$(29) returns the cursor to the right margin. On some printers, CHR$(29) is used as a control code to alter the width of the characters produced.

Preferred car rental companies are next listed to the screen, and the traveler offered a choice of any that have previously stored in a disk file CARS, and loaded into a string array CAR$(n). Each rental company has a number next to it, and user merely inputs the number to make a selection. The name of the car rental company and the reservation phone number, previously stored,

...it allows entering a large list of clients/friends/contacts in a city...

is loaded into CITY$(NC,3) with no additional user input. Because some car rental companies are located off-airport, a provision is made for the local telephone number to be added to CITY$(NC,3).

Frequent flyers usually develop a preference for one airline, even though many typically serve a given airport. CITY$(NC,4) stores the name(s) of the favored airline(s).

A repeating loop allows entering a fairly large list of clients/friends/contacts in a city, along with their companies and phone numbers. A list up to 255 characters long may be input into CITY$(NC,5). These are each kept separate by CHR$(13), etc., and input stopped by entering "#".

Comments about a city are reserved for CITY$(NC,6). One traveler may want to make a note of that used bookstore on Burnside in Portland that always has some good additions to his collection of books on Spain. Another might comment on a fantastic restaurant favored by a key client. Any notes, up to 255 characters, may be inserted here, and updated as frequently as desired.

When all six columns of data have been entered, the program automatically saves the sequential disk file to the disk in a subroutine at lines 1880-1960. First, a file is opened using N$ (the traveler's last name and first initial, remember) as the file name, and the new value of NC printed as the first item in the file. Then a pair of nested FOR-NEXT loops, FOR N = 1 TO NC, and FOR COL = 1 TO 6 printing the respective values of CITY$(n,col) to the disk file. CHR$(34)'s are added fore and aft to keep string delimiters that might have been LINEINPUT properly within their respective strings.

Update a city. This module beginning at line 1350, first accesses the subroutine at line 250 to print the current city file to the screen. It should be noted that only 12 cities are listed to the screen at a time. The program pauses, and uses a paging subroutine (lines 1980-2020) each time N can be evenly divided by 12 (line 300).

The number of the city to be updated is entered and stored in the variable UP. Next, the UP row of CITY$(row,col) is displayed, one column at a time, and the user asked if that information should be changed. If so, control branches to 1510.

Now, when the data is originally input, the information is stored in the last element of the array, NC. To update, an element that may be somewhere in the middle, UP,

is used. But, we want to reuse the original input subroutines, which use NC as the variable. To prevent problems, the value in NC is temporarily stored in variable T, and NC given the value of UP. FLAG is set to one to indicate this has been done. Then CITY$(UP,N) is nulled, and the program accesses whichever subroutine is appropriate for the array element that must be updated. After all six columns have been offered for update, control drops down to line 1480. If FLAG = 1, then NC is restored to its previous value (T), and the newly updated array saved to disk.

Enter new car rental companies. The information about car rental companies, stored in the disk files CARS and NUMBERS, is loaded into CAR$(n) and NUMBER$(n) when the program is first run. If you plan to include more than 11 rental companies, you should add a DIM statement in line 70 to allow enlargements of these two arrays appropriately.

The number of companies currently in the file is indicated by the variable NR. When new rental firms are added, beginning at line 1580, NR is incremented by one. The new company and its toll free reservation number are input and stored, and then the updated CARS and NUMBERS files written back to disk. The user never sees the NUMBER$(n) file. He or she only indicates the company of choice, and that company's phone number is automatically tacked onto the appropriate city file.

Set up a trip. Once again, the cities available are listed to the screen. The user inputs the numbers of the cities in the order in which they will be visited, and adds the dates. The city numbers are stored in an array VISIT(v), and the dates in DA$(v). After all the cities to be visited on a given trip are input, the important data are sent to a printer. The traveler's name is printed at the top of the report, the name of each city and the arrival date are also printed. Then the other five columns of information about that city are printed out.

Quick printout provided

A company can send these printouts to a travel agent, or the firm's internal travel arranger, who will make the necessary reservations. Even a small company can have five or six people who travel regularly, keeping track of preferences for accommodations and transportation can become quite time-consuming. The program provides a quick printout that can be as timely as the most recent updating.

Travel Planner is not an itinerary program, although a number of these have been developed and published in microcomputer magazines. However, imaginative business users may find ways of interfacing these two closely-related types of programs. For example, the address and local phone number of a hotel could be entered into a city's file, and transferred to an itinerary program that would print it out along with departure dates, airline flight numbers and times, etc. In addition, especially for longer trips, it would be useful to have the program look at all the reservation phone numbers. Those that are repeated can be combined so that the trip planner will know at a glance that the Holiday Inn's central reservation number must be called to reserve rooms in Oklahoma City, Dallas, and Houston, while Ramada Inns must be called for Des Moines and St. Louis. □

Program on page 154

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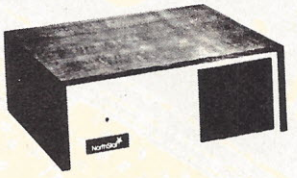

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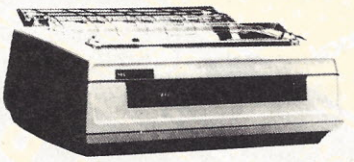

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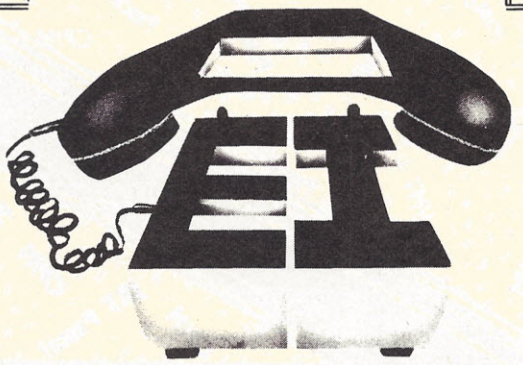

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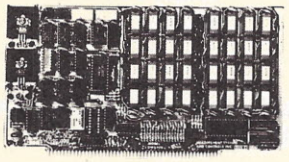

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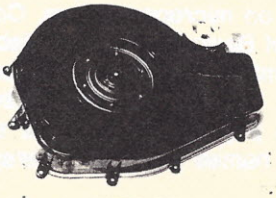

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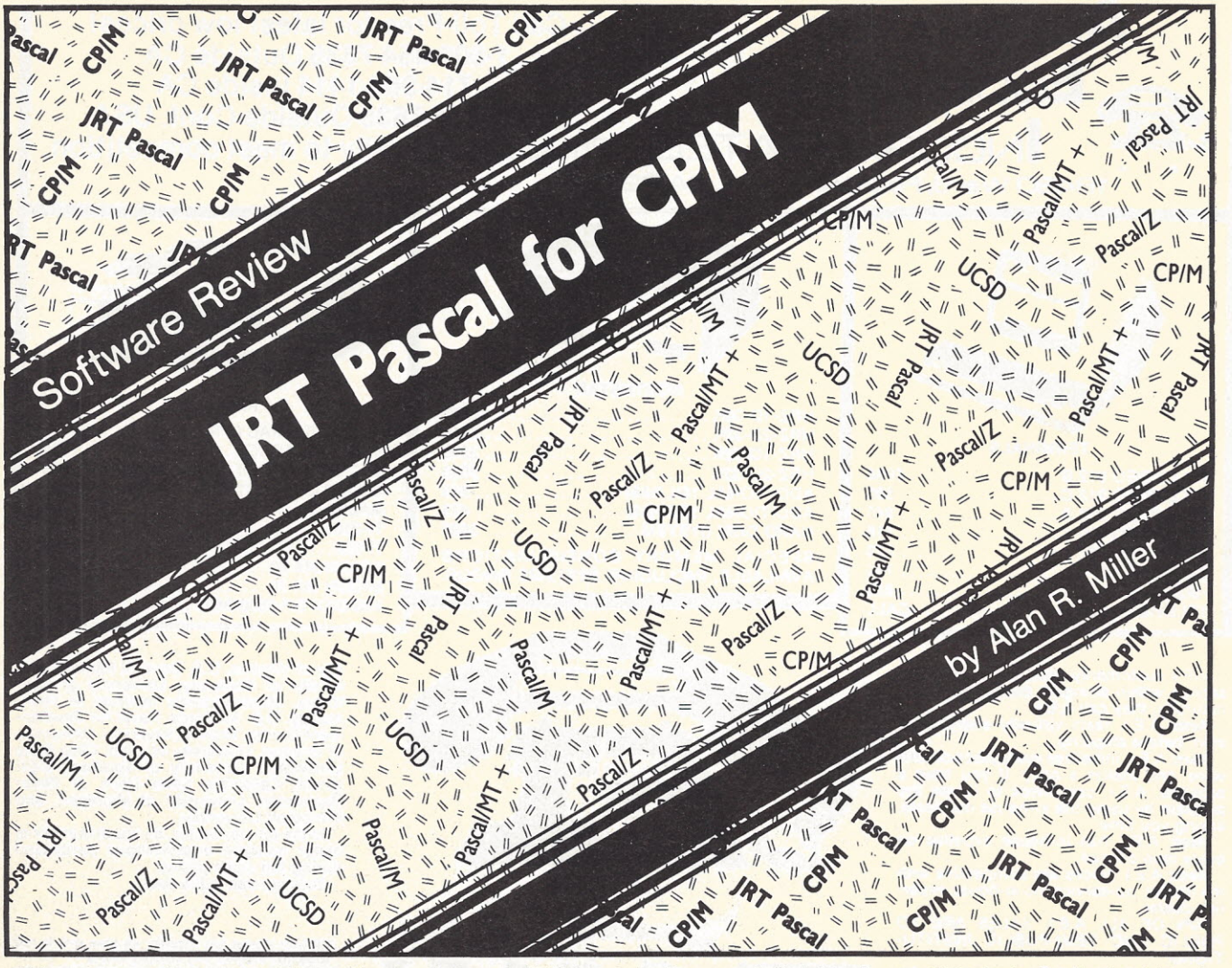

There are now several Pascal compilers available for CP/M. JRT Pascal, San Francisco, CA is the latest addition.

Basic was the first high-level language to be implemented on microcomputers. Consequently, there is a wealth of Basic software available. However, the many shortcomings of the early Basics led to improved alternatives. CBasic, an interesting variation of Basic, became popular because of such features as long variable names (up to 32 characters), a

```
While
. . .
Wend
```

construction and Bcd arithmetic. Furthermore, line numbers are not needed in the source program except to provide a label for branching.

Microsoft's version 5 Basic (MBasic) also features long variable names and the While . . . Wend construction. This version uses binary arithmetic which is generally faster than Bcd, but can produce roundoff errors.

Two of the major problems with the Basic language are present on both CBasic and MBasic. A serious disadvantage is that all variables are global. Thus, a subroutine written to sort the array X cannot be used to sort the array Y. Array Y has to be copied into array X prior to calling the subroutine. Then, the sorted array has to be copied back into array Y after the sorting process is complete.

A second disadvantage of Basic is the lack of block structure. Constructions such as

```
For          While       IF . . .
. . .        . . .         THEN . . .
Next         Wend          ELSE . . .
```

that are available in CBasic and MBasic do allow for some structuring. Nevertheless, general

```
Begin
. . .
End
```

blocks are not available.

Another alternative package is SBasic (IA Apr 81). This interesting variation hardly looks like a Basic at all. Complete block structuring is available with expression such as

```
Repeat       While       Begin       If
. . .        . . .       . . .         Then . . .
Until . . .              END           Else . . .
```

An additional feature of SBasic is that scalar variables can be defined locally within certain blocks. Nevertheless, arrays are defined globally as with the other Basics.

Fortran for micros has been available from Microsoft

for several years, but it has not become very popular. A major advantage of Fortran is that subroutines can have locally defined arrays as well as scalars. Furthermore, parameters for subroutines can be anything. Thus, it is possible to pass the address of a scalar, an array, selected portions of an array, or the address of another subroutine or function. Double precision arithmetic is available and provides precision to about 14 decimal digits. Variable names are limited to a maximum of 6 characters.

Fortran, however, lacks even the simpler structural elements of the better Basics. For example, only a single statement can be coupled to an IF statement and there is no If..Then..Else construction.

The Pascal language addresses most of the shortcomings of Basic and Fortran, although it is not without problems itself. Pascal/M by Sorcim was reviewed in IA Sep 80. Both arrays and scalars can be designated as either local or global variables within program blocks. In addition, types can be defined as sets and records.

The maximum symbol length depends upon the implementation. It may be as few as six characters, or as large as 32. Furthermore, the underline character can usually appear in the name. Thus symbols such as

```
WRITE_DATA
GET_DATA
SUM_X        and
SUM_Y
```

can be selected for easier comprehension of the source code.

A major advantage of Pascal is block structuring. The construction:

```
BEGIN
  (some statements)
END
```

can generally be utilized wherever a single statement is required. There are three forms of loop control:

```
FOR i: = 1 TO n DO
WHILE (expression true) DO . . .
REPEAT
  . . .
UNTIL (expression true)
```

In addition, there is an extended IF statement:

```
IF (expression true)
  THEN
    BEGIN
      (some expressions)
    END
  ELSE
    BEGIN
      (some other expressions)
    END
```

Also a CASE statement can be used for multibranching.

The Pascal language provides for the passing of procedures and functions as parameters to other procedures. However, no current Pascal compiler implements this feature.

There are currently several different Pascal compilers for the 8080 and Z-80 microprocessors. These are:

```
UCSD
Pascal/Z
Pascal/M
Pascal/MT +
JRT Pascal
```

The UCSD version is not compatible with CP/M. It includes its own operating system of sorts and a text editor. The other Pascals run under CP/M. Pascal/Z will run only on a Z-80 microprocessor. With the CP/M versions, the user writes a source program using the system editor. Then the source program is compiled into binary code in one or more steps.

Some of the Pascal packages generate an intermediate P-code file. Pascal/Z first converts the source program into assembly language. Pascal/MT converts the source program directly into binary code. All CP/M versions of Pascal are very different. They all work, more or less not one is totally bug free. The problems are small, but they can be irritating.

Sorcim's Pascal/M is a pleasure to use. The error messages are extremely helpful, making it easy to find and correct syntax errors in the source program. I was also able to run all of the programs on the JRT Pascal package. I found a few minor bugs with JRT Pascal, but these should be fixed soon. The error messages generated by the compiler are also very helpful.

The most serious disadvantage of Pascal is the size of the compiler. Most of the implementations require a 56K CP/M system (Pascal/MT requires 52K). As a consequence, it may not be possible to compile large Pascal programs. JRT Pascal, Pascal/MT + and Pascal/Z address this problem by allowing parts of a program to be compiled separately. With this arrangement, procedures (subroutines) for sorting, matrix solution, plotting, etc., can be separately compiled into separate modules. Then, at execution time, the modules are linked together. Since the large Pascal compiler is not needed at link time, it is possible to run very large programs by using this modular approach.

Another advantage is that floating-point operations are performed in 14-figure Bcd. The dynamic range is 10^{63}. The other Pascal implementations only maintain 7 digits of precision and have a dynamic range of 10^{36}.

In standard Pascal, integer, real, boolean, and character variables are predefined. Pascal/M, Pascal/MT + and UCSD additionally define a dynamic string type. In this case the statement:

```
VAR
  NAME, ADDRESS : STRING;
```

is all that is needed to declare string variables.

With other Pascals, the user must include statements such as:

```
TYPE
  STRING = PACKED ARRAY[1 . . 20] OF CHAR;

VAR
  NAME, ADDRESS : ARRAY[1 . . 100] OF STRING;
```

This is also true with JRT Pascal. However, once a string variable is declared, the string space is dynamically allocated, just as it is with Pascal/M and UCSD Pascal. The dynamic string feature makes string operations very easy.

If the dynamic string feature is not implemented, then string operations are more difficult. For example, each use of a string array such as Name and Address must include exactly 20 characters, filled out with blanks if necessary. By comparison, dynamic string variables can be any length. Dynamic strings are similar to those in MBasic.

Pascal programs must begin with the line:

```
PROGRAM PNAME(OUTPUT);
```

where PNAME is the program name chosen by the programmer. Most versions of Pascal ignore the program name. However, JRT Pascal requires that the name precisely agree with the disk filename. The argument of following the program name (OUTPUT in this case) is another possible source of trouble. Some versions of Pascal require the argument (the Dec20 is one), others tolerate it, and still others forbid its use. It is optional in JRT Pascal.

There are two common methods of declaring separately compiled procedures and functions. UCSD and Pascal/M utilize and include a directive which looks like a comment:

```
(*$I filename *) (USCD)
(*$F filename *) (Pascal/M)
```

The other approach is to use an external declaration. In this case the procedure or function heading is given with its parameters as if it were a forward reference.

```
PROCEDURE PLOT(
            X : ARY; (* INDEPENDENT VARIABLE *)
            Y  : ARY; (* DEPENDENT VARIABLE *)
  LENGTH :  INTEGER);
EXTERN;

FUNCTION CUBE ( X : REAL) : REAL; EXTERN;
```

The word EXTERN (or EXTERNAL in Pascal/Z) is used in place of the word FORWARD. Then the separate file, containing the procedure, must declare parameters as necessary. For example

```
EXTERN
  CONST LEN  =  20;
  TYPE   ARY   :  ARY[1 . . LEN] OF REAL;

PROCEDURE PLOT( X, Y : ARY;
                N     : INTEGER);
. . .
BEGIN        (* PLOT *)
. .
END.
```

Notice that a decimal point must be the last character in the external file even though the file is not a main program.

The array dimensions in separately compiled procedures and functions are fixed at compile time. Therefore, if an array length is changed in the main program, the corresponding dimension at the head of the separate procedure will have to be changed. Everything will have to be recompiled. Of course, one advantage to separate compilation is that if a change is made to one module only, that module has to be recompiled.

JRT Pascal incorporates several assembly language operations. These allow you to perform direct port input and output, direct memory operations and to use hexadecimal addressing. In addition, a separate compatible assembler is included so systems programs can be efficiently included. If you need 14 figures of precision (e.g., for real estate values) or you need to compile very large programs, JRT Pascal may be just what you need.□

CIRCLE INQUIRY NO. 153

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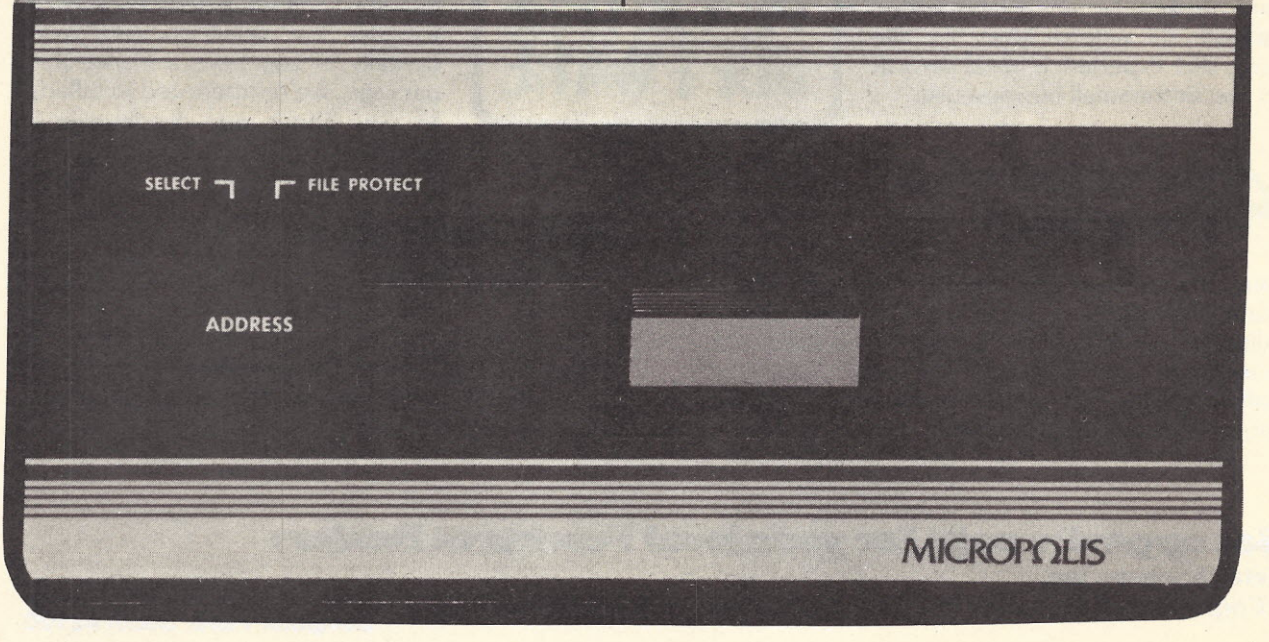
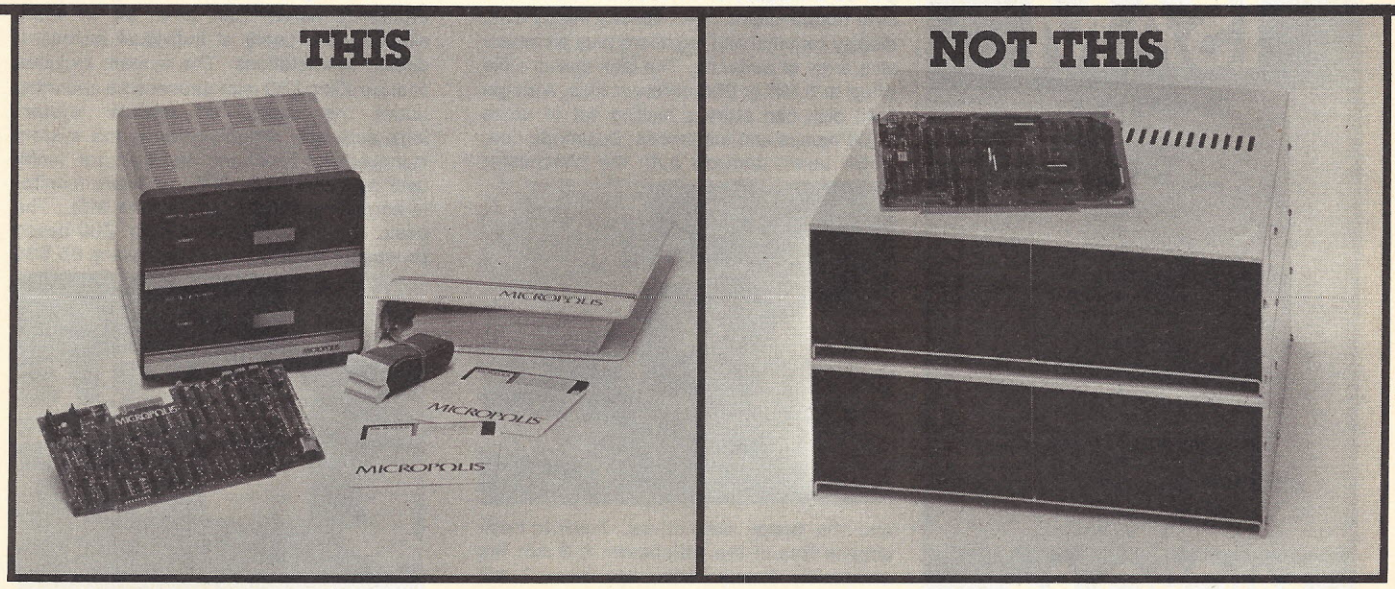
MICROPOLIS has a reputation for getting along with most everybody. Compatability is not a problem with MICROPOLIS. Their disk drives and/or subsystems can be easily integrated into systems such as Polymorphic, Cromemco, CCS, Ithica Intersystems, Godbout, Northstar, Jade Big Z, QT SBC 2/4, and many others. Many OEM manufacturers rely on MICROPOLIS to get the job done efficiently. Companies like Commodore, Exidy, Harris, and Vector Graphics to name just a few. Years from now, you can look back with a secure feeling knowing you made the best choice, MICROPOLIS.



AGE CAPACITY OF IN 5 1/4" FORMAT



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MCP-1041-2	315 KB SINGLE, NO PS	$1045.00	$639.00
MCP-1042-1	143 KB SINGLE	$795.00	$625.00
MCP-1041-1	143 KB SINGLE, NO PS	$695.00	$595.00
	COMPLETE W/S-100 CONTROLLER, CABLES, MANUALS AND MICROPOLIS MDOS AND BASIC		
	ADD-ON DRIVES		
MCP-1033-2	630 KB DUAL	$1395.00	$895.00
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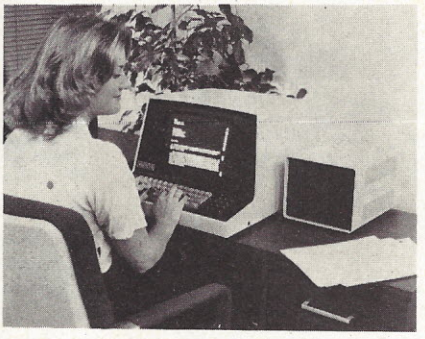
NEW PRODUCTS

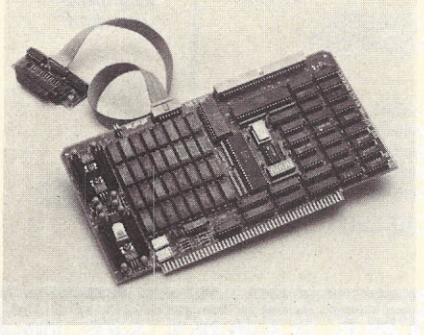
Desk-top business system with Winchester hard disk storage, Vector 3005, includes a 5¼-in. 5 megabyte Winchester, a 630 kilobyte double-sided, quad-density floppy disk, display terminal and keyboard plus an extensive array of software. The disk stores a file of up to 5 MB or 256 different files. A single hard disk can store a mailing list of up to 3700 names and addresses. Dualmode controller board controls both the Winchester



and the floppy disk drives. Track-to-track access time of the Winchester is 3 mS; the companion floppy disks also have 3 mS track-to-track access time. Both the Winchester and floppy drives are housed in a compact unit approximately 8 by 6 by 12 inches. Price: $7,950. Vector Graphic, 31364 Via Colinas, Westlake Village, CA 91362, (213) 991-2302.

CIRCLE INQUIRY NO. 225

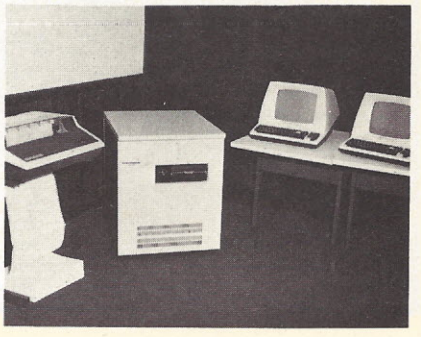
Single board microcomputer, Net/80, operates as a slave processor for data processing networks. The device is ideal for use with CP/NET. It performs as a Z-80 slave processor loosely coupled to an S-100 bus. Each board comes complete with 64K of RAM, a single level interrupt, a console serial port and a parallel port for communication with the S-100 bus master CPU. Each slave operates independently of any others, except



for resource queuing in the master. Thus, the entire system appears to be dedicated to each user, unless a large amount of shared resources are being accessed. In addition, the unit totally isolates the master CPU from errors in the slave processors. The system is compatible with most CP/M software. Price: $1,395. Bill Shultz, Musys Corp., 1451 E. Irvine Blvd., Suite 11, Tustin, CA 92680, (714) 730-5692.

CIRCLE INQUIRY NO. 226

Small business computer system, Symcro SB700, uses an advanced multiple-microprocessor architecture to achieve modular expandability, ease of use, and compatibility with existing software. The system can efficiently serve from 2 to 24 or more simultaneous users at individual keyboard/display workstations. The system includes multiple Zilog Z80 microprocessors operating under the control of modular system logic software, which performs the system management functions required for multi-user operation. The CP/M software monitor is normally incorporated into the MSL. The basic system consists of four Z80-based processor modules (each containing 65,536



bytes of memory), a 10-million-byte fixed disk drive, an industry-compatible 8-in. diskette drive, two keyboard/display workstations, a 150-character-per-second printer, and all operating software. Two of the four processor modules are normally allocated to user applications, while the other two are normally used for peripheral control and system management functions. Price: $24,975. Symcro Systems, 200 Office Center, 275 Commerce Dr., Fort Washington, PA 19034, (215) 542-8900.

CIRCLE INQUIRY NO. 227

Rack mounted systems for OEM and industrial needs, the MSC-6600 family, are Multibus compatible, enabling users to quickly implement their microprocessor-based systems without having to design computer hardware. Features include an 8080A microprocessor, 64K bytes of RAM, and dual 8-in. double density single-sided floppy diskette drives. An industry-standard CP/M (version 2.2) operating system software, included as part of the basic configura-

tion, gives users a broad range of languages and utilities for software development. Typical CP/M compatible software products available include industrial Basic, commercial Basic, Fortran 77, Pascal, PL/M Cobol, data

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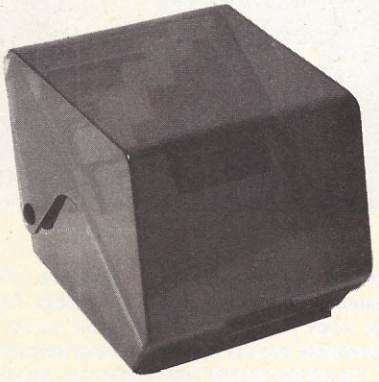

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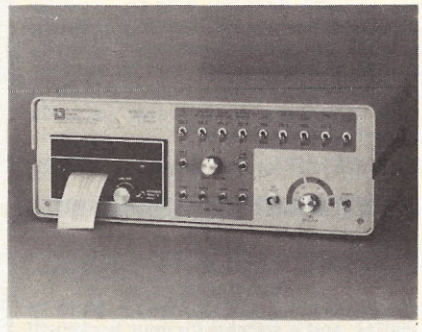
CIRCLE INQUIRY NO. 228

Data test set printer, model 2910, introduces a quiet, thermal printer head for a permanent, unattended record of data interface test results. The printer is designed to operate with the WECo 1ARDT (radio digital terminal) and WECo 914B data test sets equipped with the IDS model 25 full-duplex long word converter kit or the model 15 full-duplex adapter kit. The printer can be used on-line to obtain a record of failures of critical signals in the various data interfaces under test or off-line, for a record of data errors, block errors, and failure of EIA interface signals. Features include a pre-settable real



time clock, three selectable print routines, six selectable trigger channels and seven selectable print intervals. For paper reloading, the printer mechanism is easily removed from the front panel of the unit. The printer is simple to operate. The operator starts the test by selecting the appropriate channel he wishes to record. Printouts are initiated whenever any of the selected events occur. Trigger channel inputs are stored to allow a printout of any two events that occur simultaneously. Price: $4,410. International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865, (401) 333-6200.

CIRCLE INQUIRY NO. 229

Daisywheel printer, Starwriter, is a letter quality receive only printer. It runs at 25 characters per second and comes with an industry standard Centronics compatible parallel interface, using Diablo ribbons and printwheels. It has full graphics capability (1/120-in. horizontal control, 1/48-in. vertical control) and is completely code compatible with Qume and Diablo so no software changes are required to use boldface, underlining and bidirectional printing. The printer measures 24½ by 15 by 10 inches and weighs 44.1 pounds. It accommodates paper widths up to 15 inches and will furnish three clear copies. The printer comes with a 90 day limited warranty. Computer Textile, 10960 Wilshire Blvd., Suite 1504, Los Angeles, CA 90024, (213) 477-2196.

CIRCLE INQUIRY NO. 230

Hard copy printer/plotter enables hard copy production from up to four Tektronix 4025 refresh raster computer display terminals. Generating both graphics and text data, the controller samples the maximum graphics area of 640 horizontal points by 462 vertical lines from the memory and expands three to one for hard copy production. Text in the form of 53-line pages also can be duplicated. When used with a 200 point per inch printer/plotter with 11-in. wide paper format, such as the V-80, final image size is 9.6 by 6.9 inches. Copy requests can be made from the terminal or via the controller's copy request switch. In most cases, copies

are generated within ten seconds. The resulting copies are legally archivable. Cost per copy is approximately three cents. A selectable priority system enables switching of the printer/plotter from computer-directed printing or plotting to hard copy output. The standard priority system allows the computer to complete a print line/plot scan or continue to end of page/plot. Computer-directed work also can be interrupted immediately via the controller hard copy switch or be continued until the computer has completed the entire job. Price: $2,500. Versatec, 2805 Bowers Ave., Santa Clara, CA 95051, (408) 988-2800.

CIRCLE INQUIRY NO. 231

Word processor contains additional features and simplifies operator use. The SDS 420 features format-to-screen layout and a function-oriented keyboard. Format-to-screen layout allows the operator to see text on the video display before committing it to paper. This permits on-screen editing of the text, including the setting of margins and tabs,

word insertion/deletion and paragraph realignment. Function-oriented command keys on the new keyboard eliminate the need for the operator to learn complicated commands, by requiring only a single keystroke and specifying the command on the key. It possesses full editing capability, including such features as automatic pagination, auto-merge (the joining of two files, such as a mail list with a form letter), and global search and replace (changing specific items in text, such as names or dates, automatically). One body of text can be edited at the same time different text is being printed. A paste command permits insertion of a section of text used previously without retyping. Horizontal scroll

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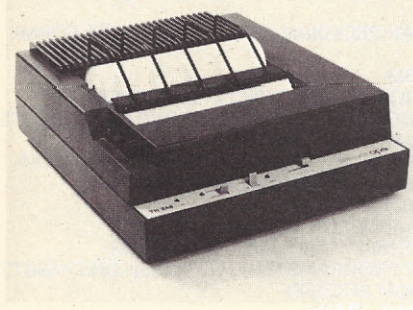
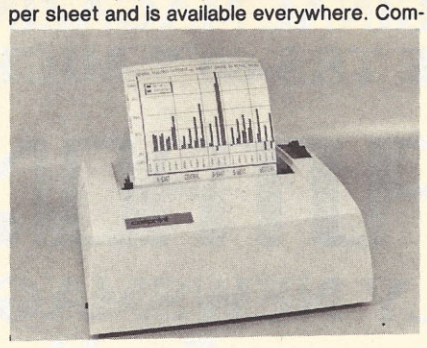
allows examination of wider-than-screen text (reports, tables, etc.). The system is designed to permit immediate access to all files. Storage capacity is 200 pages per disk, with an unlimited number of disks. The Diablo 630 printer, which utilizes both plastic and metal print wheels, is standard. SDS, 344 Main St., Venice, CA 90291, (213) 390-8676.
CIRCLE INQUIRY NO. 232

Thermal printer/plotter, the TH 240, is an 80 column thermal printer for operation to 240 lpm. This speed permits it to print up to 1200 baud on-line or to copy a full 24 line CRT display in less than 6 seconds. Faster burst rates are accommodated by the 756 character buffer. The printer/plotter may be purchased in the alphanumeric configuration for printing applications or the alphanumeric plus plotting configuration for dual use. In



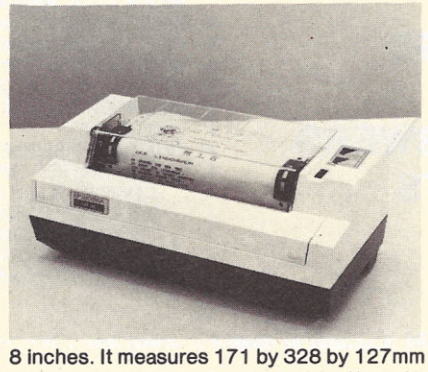
the plotting mode the unit produces 70 dots/inch resolution with 560 dots across the paper width. The basic unit is provided with RS-232 or current loop interface. The thermal comb print head provides quiet operation. Price: $1,395 for alphanumeric version and $1,595 for alphanumeric plus plotting version. Printer Systems Corp., 1 W. Deer Park Rd., Suite 104, Gaithersburg, MD 20760, (301) 840-1070.
CIRCLE INQUIRY NO. 233

Graphics printer, model 912-GO, is designed for crisp, clean, high resolution graphics hardcopies from computers and terminals. The unit prints a raster which has 720 dots horizontally in 7.3 inches centered on an 8.5 inch page and has a vertical size limited only by the paper length. Resolution is 100 dots per inch in both the vertical and the horizontal plane. Alphanumeric data transferred to the printer in binary format will also be printed. It is an electroresistive printer that operates up to 4 times faster than impact printers costing hundreds of dollars more. At 32 dot rows per second the Comprint is remarkably fast. It prints an 8½ by 11-in. page in 30 seconds. The 8½-in. aluminized paper required costs about 2⅓¢ per sheet and is available everywhere. Com-



puter Printers Int'l., 340 E. Middlefield Rd., Mt. View, CA 94043, (415) 969-6161.
CIRCLE INQUIRY NO. 234

Dot matrix impact printer, GP-80M, has upper/lower case Ascii, double width characters, and dot graphics modes. It features a single print hammer and rotating drum combination that gives the same 5 by 7 dot matrix as the standard 7-wire print head. Printhead life is 30 million characters. Print speed is 30 characters/sec. with original plus-two copies capabilities and adjustable tractors to accommodate paper widths up to



8 inches. It measures 171 by 328 by 127mm (approx. 7 by 13 by 5 inches, D by W by H) and weighs 5.5 lbs. Consuming 15 watts while printing and 5 watts in standby, it operates on 117 VAC +/– 10% at 50/60 Hz. Parallel and serial interfaces are available for connection to a variety of systems. Price: $425. Distributed in North America by Watson, Burton and Assoc., Port P.O. Box 122, Yokohama 231-91, Japan, telex 3822596.
CIRCLE INQUIRY NO. 235

Intelligent terminal system, Q310, is compatible with all Univac CPUs and is designed as an alternative to the U200, UTS400, UTS20 and the UTS40 workstations. The unit is compact, durably constructed and extremely light, weighing only 35 lbs. The keyboard has both upper and lower case, full numeric pad, and 20 function program keys as standard equipment. The model has screen by-pass, paging, multi-line,

and multi-address features. It is available with up to 64K of RAM for users involved in design or developmental programming. The disk oriented system is CP/M based. It offers the user an initial quarter meg disk that is upgradeable in increments to a two meg disk operating system. It can be programmed in any CP/M based package and any high level assembler such as Cobol and Basic. The Q310 disk system also has graphics capability. It has a base price of $3,000 for one unit sales. Univac Div., The Computer Place, 4595 Van Epps Rd., Brooklyn Heights, OH 44131, (216) 351-7444.
CIRCLE INQUIRY NO. 236

Single terminal, Terminal-Master 1, combines microprocessor-based technology with a standard KSR to offer TWX, Telex and DDD communications. Standard features include keyboard dialing, programmable answerback

and a software package for customizing and updating programs. Single-letter codes activate various modes. If forgotten, an electronic prompter guides the operator to the correct procedure. A typewriter-like keyboard

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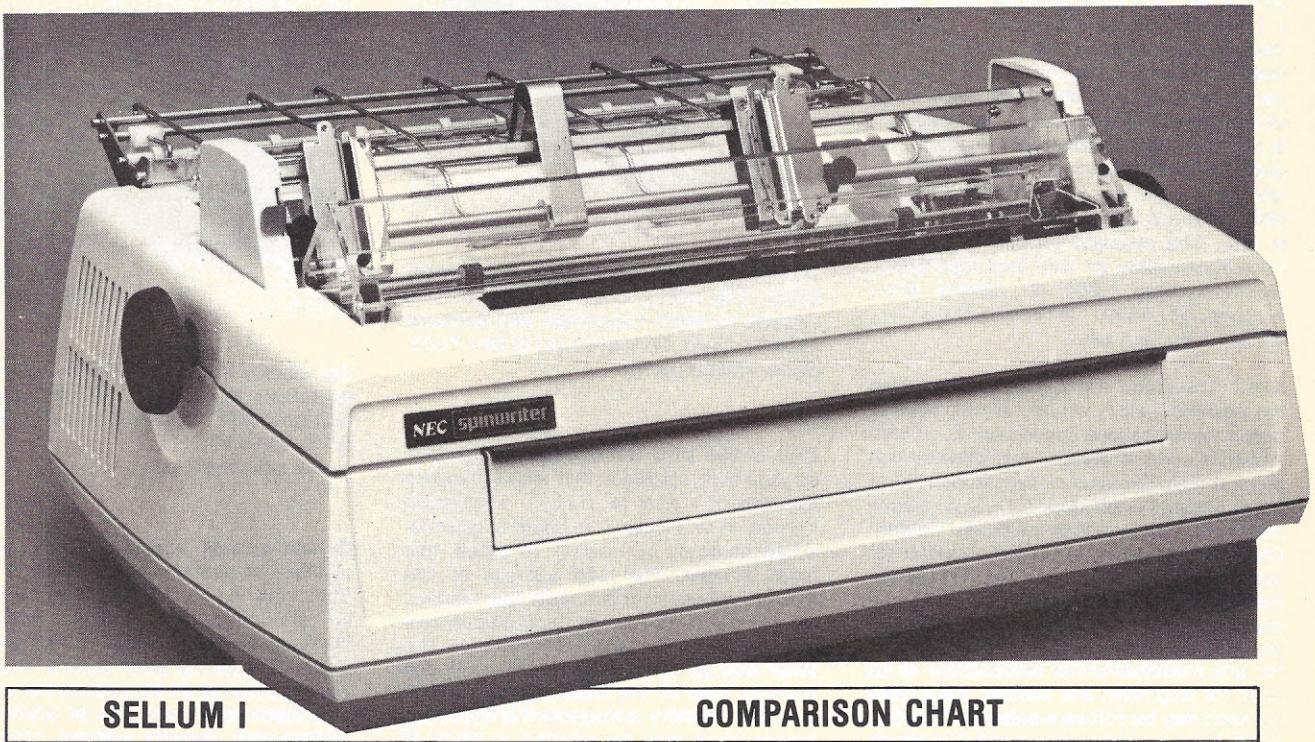

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FEATURES	NEC5510	NEC5515	NEC5530	SELLUM I
Print Mechanism	NEC	NEC	NEC	NEC
Serial Interface	✓	✓		✓
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Buffer Size	256 char.	256 char.	256 char.	650 char. Option 16K
Automatic Bi-Directional Printing				✓
Logic Seeking for Optimized Thru-put				✓
Select. Filtering Non-Standard Control Char.				✓
Diablo Compatible (option) Software		✓		✓
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Coded Beeper				✓
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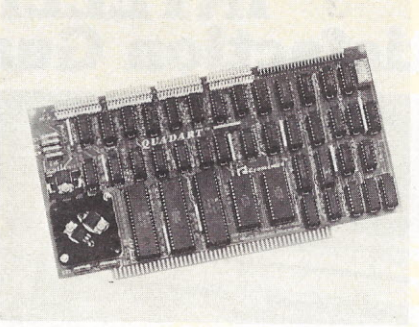
permits changes and erasures to messages already in memory and a few minutes of simple instructions are all that's required to start transmitting. Terminal Systems, 11300 Hartland, N. Hollywood, CA 91605.
CIRCLE INQUIRY NO. 237

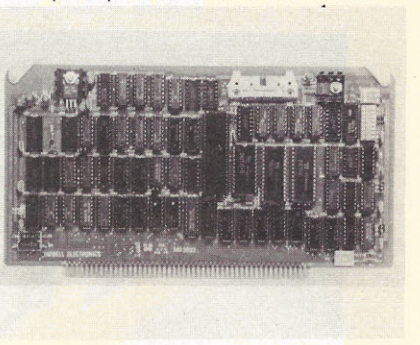
132 column monitor, VR-800L15, displays an 800 by 1200 non-interlaced raster using a 15-in. CRT in the "landscape" position. Designed for use in computer and word processing systems, the monitor can be used to generate 66 lines of upper and lower case alphanumeric characters. The entire screen is refreshed at 60 frames per second, producing a flicker-free image. The 50 kHz scan rate, coupled with a video bandwidth of 65 MHz produces clearly defined pixels 8 mils in size. The standard phosphor is P-104. Price for quantity of 100: less than $600. Moniterm Corp., 250 N. Central Ave., Wayzata, MN 55391, (612) 475-1106.
CIRCLE INQUIRY NO. 238

S-100 interface card, Quadart, provides the power to satisfy virtually any high-speed data communications application. Each card has four serial channels. Any channel can support asynchronous or synchronous byte mode (Bisync) or bit mode (SDLC) communication protocols under software control. Complete handshaking is also provided for modems. A unique loopback feature provides the capability to connect data from any channel to any other channel, data from any modem to any other modem, or the capability for any modem/channel combination to be used for diagnostic and selftest. Baud rates for each may be software-selected from 0 to 300K baud (asynchronous to 19,200 baud). Control for the unit is from the C-bus provided by the powerful I/O processor computer (model IOP). The IOP interfaces between the S-100 bus and the C-bus and can support up to four units with full interrupt capability.



The interface (model QDRT) is available for $595. The I/O processor (model IOP) is available for $695. Cromemco, 280 Bernardo Ave., Mt. View, CA 94043, (415) 964-7400.
CIRCLE INQUIRY NO. 239

Z-80 S-100 CPU board features memory-management hardware that allows dynamic mapping of logical to 1M-byte of physical memory in 4K blocks. The board consists of a fast on-board memory of 16 bytes, that holds a table. The 4-bit address of this memory comes from the upper four address lines of the Z-80. Four of the 8 output lines go to the A12 and A15 bus address lines. The other four go to the A16 to A19 extended address lines of the IEEE standard S-100 bus. If no memory management is desired, a jumper block may be inserted in place of each of the two memory ICs. The on-board table memory may be loaded by the programmer or system software with I/O commands. It can run at 2 or 4 MHz, jumper selectable. It has two RS-232 serial ports, with full handshaking capability. Another feature is a crystal-controlled programmable timer (8253) which can be used for time-of-



day clock and for time-slicing multi-tasking operations. Price: $450. Tarbell Electronics, 950 Dovlen Pl., Suite B, Carson, CA 90746, (213) 538-4251.
CIRCLE INQUIRY NO. 241

Dynamic RAM board that is completely multibus compatible allows the user to add 32K, 64K, 96K or 128K of dynamic RAM to an existing system. Parity checking is standard and will generate an interrupt if any single bit memory error occurs. The board decodes the full 24-bit address bus and runs at a maximum access time of 300ns with a system-wide memory address capacity of

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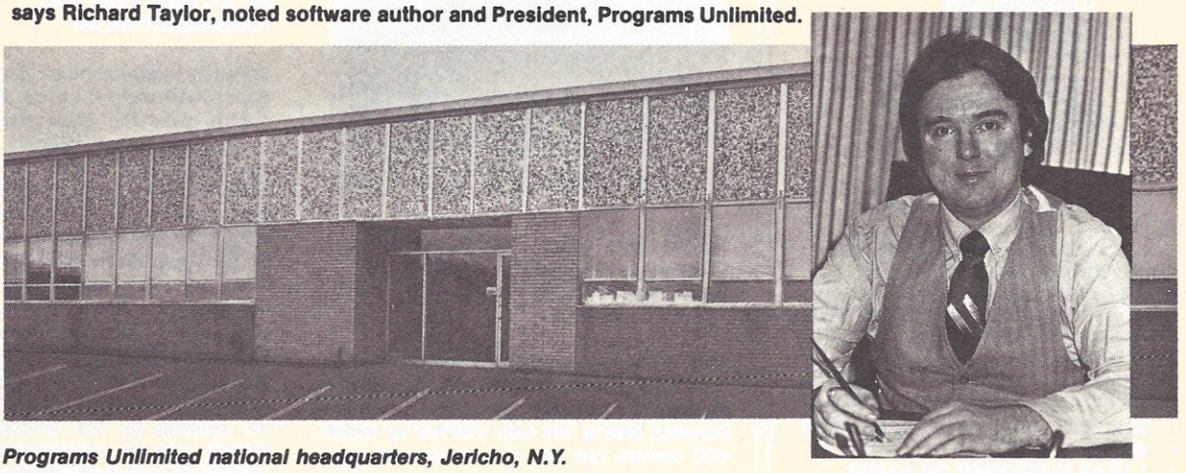

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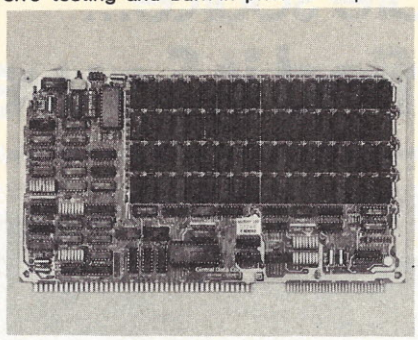
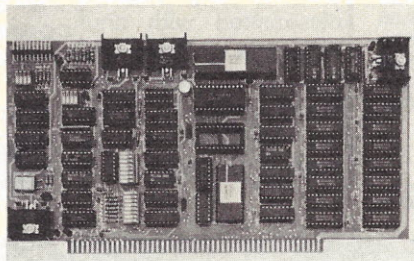


Central Data Corp., 713 Edgebrook Dr., Champaign, IL 61820, (217) 359-8010.
CIRCLE INQUIRY NO. 240

Atari 32K memory board can be used in both the 400 and the 800. User installable, it permits economical purchase of mass memory, and is the only method by which 400 owners can use disk drives and large data arrays while operating in high resolution graphic modes. Mosaic Electronics, Box 748, Oregon City, OR 97045.
CIRCLE INQUIRY NO. 242

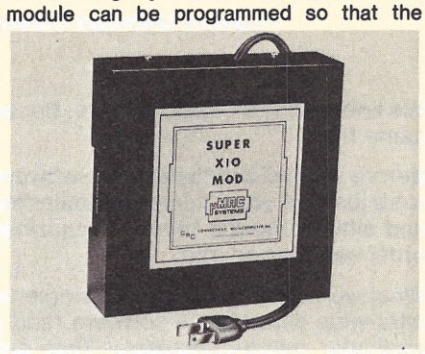
32K RAM expansion for Atari 400, 800, Ramcram, can expand the 400 to 32K, and the 800 up to 48K-bytes of random access user memory. The module contains 16 memory chips, yielding a total of 32K bytes of additional memory. In the 400, the unit is installed by removing the top enclosure of the computer console and unplugging the 8K RAM module, then plugging the module into the same slot. It upgrades a 400 to the capabilities of the 800 with 32K of RAM. Any 32K Atari 800 software on the market will run on a 400. Axlon, Inc., 170 N. Wolf Rd., Sunnyvale, CA 94086.
CIRCLE INQUIRY NO. 243

Z-80 CPU board, CB2, for S-100 based systems is capable of operating at 2MHz or 4MHz by DIP switch selection and includes sockets for two 2716 or 2732 EPROMs or HM6116 2K RAMs. Separate run/stop and single/step switches are also included on the board to permit system evaluation without the need for a front panel. The unit also features firmware vector jumps and an output port to control eight extended address lines. These permit the use of more than 64K of additional memory with the CPU board. Jumper options on the board will also



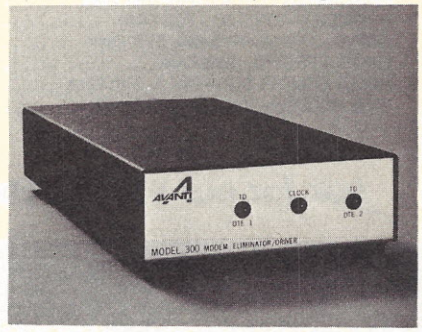
generate the industry's new proposed IEEE S-100 signals. The on-board EPROMs have a capacity of 2048/4096 by 8 bits, are DIP switch addressable or disabled and have one wait state added. The on-board RAM has a capacity of 2048 by 8 bits and is also DIP switch addressable or disabled. The board requires only +8V at 0.75A typical (less EPROMs). Available for immediate delivery, the price for the assembled and tested CB2 CPU board is $654. SSM Microcomputer Products, 2190 Paragon Dr., San Jose, CA 95131, (408) 946-7400.
CIRCLE INQUIRY NO. 244

Security systems control is offered by the Super X-10 Mod. It allows direct computer control over the basic components in a home/office security system. Developed for use with most popular microcomputers, including Pet, Apple, TRS-80 and Kim, the Mod controls up to 256 different remote devices by sending signals over house wiring to readily available BSR remote modules. These low cost modules, in conjunction with the Super X-10 Mod, allow microcomputer control over lamps, motors, and appliances. With eight digital inputs and eight digital outputs included, the module can easily be connected to switches at windows and doors for sensing by the microcomputer. The module can be programmed so that the



opening or closing of a window or door initiates a sequence of operations such as turning on lights, radio, and alarm, even if the computer is turned off. Direct, plug-in compatibility and software are available for most microcomputers. In addition, the unit can put kitchen appliances, stereo systems, television, motors, fans, pumps, and laboratory equipment under computer control. Price: $249. Connecticut Microcomputer, 150 Pocono Rd., Brookfield, CT 06804.
CIRCLE INQUIRY NO. 245

Modem eliminator/driver, the 300, for sync or async operation at distances up to 400 feet allows direct connection between terminals and computers. The modem provides digital regeneration of signals from any one terminal equipment to another to achieve the increased operating distance



and at the same time, it provides the necessary EIA signal interchange between the terminals. Available as desk top or rack mounted. Price: $360 in single quantities. Avanti Communications Corp., Aquidneck

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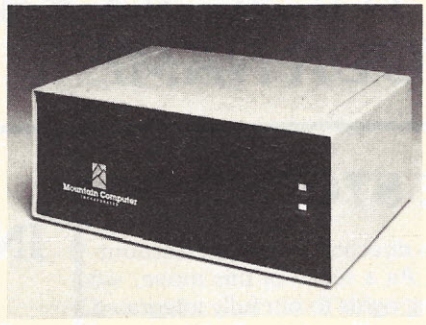
CIRCLE INQUIRY NO. 246

Expansion chassis offers eight additional slots to expand the peripheral capacity of all Apple II computers. The user can select these slots with a panel mounted select/deselect switch or with immediate or deferred software commands. The slots are fully buffered bi-directional data lines. The chassis comes with an Apple II interface card. The heavy-duty power supply is primarily for peripherals without the demand of the Apple



mother board support chips, memory, video, etc. More power is available for peripherals in the chassis than in the Apple itself. Mountain Computer, 300 Harvey W. Blvd., Santa Cruz, CA 95060.

CIRCLE INQUIRY NO. 247

Billing and management system is designed for lawyers and other professional groups whose special billing requirements include combinations of charges for time, disbursements and standardized services, PCB allows monthly charges to be held for review before release as detailed statements and summary bills. General ledger accounting, payroll and personal, and accounts payable packages complete the integrated system. In Microsoft compiled Basic, the Series III packages are compatible with all Z-80, 8080/8085-based microcomputers operating under CP/M. Price: $2,895. All packages are available separately. Serendipity Systems Inc., 225 Elmira Rd., Ithaca, NY 14850, (607) 277-4889.

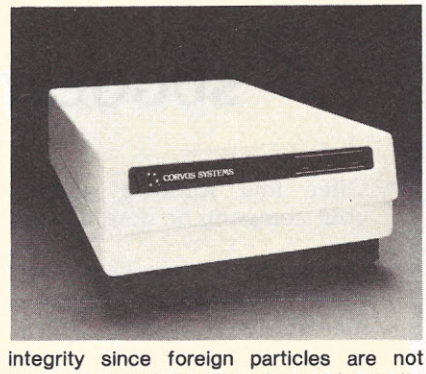
CIRCLE INQUIRY NO. 248

Uninterruptible power systems, Mintaur series, are designed for small minicomputer and microcomputer applications. Providing computer quality power, the 2.5KVA system

offers an optional (internally packaged) solid state or electro-mechanical transfer switch. The system provides 125% overload for 15 minutes, 150% for one minute, and 1000% for 5-cycles via the solid state transfer switch. The system will deliver full rated power over a temperature range of −20° to +50°C. The standard system is designed for operation at 120VAC and includes an output voltmeter, a battery ammeter, a low battery alarm and circuit protection: output short circuit, current limiting and thermal protection. Proprietary circuitry, unique in the industry, protects the SCRs and eliminates the need for fuses. The 2.5KVA UPS includes an inverter operating at 87% efficiency. The battery charger and transfer switch assemblies are fully modularized, plug-in assemblies. At 14 in. H by 19 in. W by 19 in. D, the system can be mounted in a standard 19-in. equipment rack. An optional rack mountable battery system in a 10-in. high module is available and supplies up to 15 minutes of reserve power. Price: $4,275. Nova Electric Manufacturing Co., 263 Hillside Ave., Nutley, NJ 07110.

CIRCLE INQUIRY NO. 249

Plug-compatible disk drives, Series 20L, emulate the Dec RL01 and RL02 cartridge drives and are 100% hardware and software compatible. No operating system modifications are required and only a single quad-size interface is used to the Q-Bus. The powerful bus architecture provides for maximum throughput and flexibility. The 20 megabyte Corvus system uses the advanced, sealed operating environment of the Winchester technology to provide the most reliable and cost-effective disk storage medium available today. The system provides greater data



integrity since foreign particles are not allowed to reach the recording surfaces. Its low mass read/write heads have been designed to gently load and remove the heads on the disk surface to further improve system reliability. The Corvus system totally eliminates mechanical load/unload drives required in removable pack drives. The system is only 6.375 in. high, 14.5 in. wide and 20 in. deep. It's available in either rack-mounted or table-top models. Price: $6,950. Corvus Systems, 2029 O'Toole, San Jose, CA 95131, (408) 946-7700.

CIRCLE INQUIRY NO. 250

Military analog tape recorder offers eight simultaneous channels of direct record/reproduce electronics with individual channel erase. The ECR-21 is a compact, rugged unit designed for use in severe environment data acquisition, monitoring and control systems. Standard tape speeds are 15/16 ips and 15 ips with 60 ips shuttle speed. On 600 feet of tape, the ECR-21 records a total of 128 minutes. Weighing less than 18 pounds including the ½-in. tape cartridge, the unit is transport mounted on three vibration isolators inside a heavy duty frame. Active assemblies are modular to permit fast field maintenance. It stands 8.72 by 4 by 15.8 inches and may

PRINT OFF-LINE

Increase throughput. Put printers, plotters, and other slow peripherals off-line with a MicroCompatible Print Buffer. Continue processing without waiting. Save time by entering data while the printer is printing. The MicroC Print Buffer accepts data from the host computer(s) as fast as the host computer(s) can output through a parallel port, user selected 110 to 9600 baud RS-232 port, or IEEE-488 port. This data is stored and transferred to the printer(s) through a parallel port, user selected 110 to 9600 baud RS-232 port, or IEEE-488 port as fast as the printer(s) can accept it. Run times are reduced because the computer doesn't wait on the printer and the printer doesn't wait on the computer. There are no software changes to make. The Print Buffer is transparent to the user. This hardware solution is superior to a spooler because it is faster, uses none of the host computers' memory, and allows linking one or more host computers to one or more printers for better allocation of resources.

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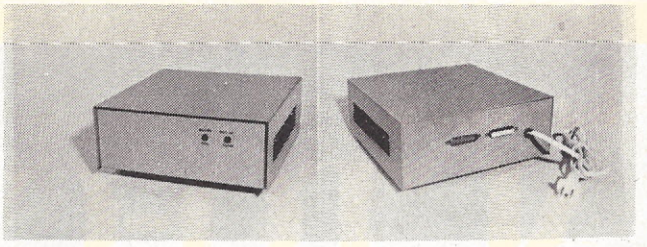

Model PB1B, 1 pair parallel I/O and 1 pair RS-232 ports

STANDARD MODELS*

Computer	Ports	Price
TANDY	Parallel ports Edge connectors gold plated	$299
APPLE	Centronics standard connectors	$345
PET	IEEE-488	ASK FOR PRICE
RS-232	RS-232, 110-9600baud	$375

*16K memory with one pair of ports

STANDARD OPTIONS
available upon request

1. 32K Memory
2. A second pair of I/O ports; parallel, IEEE-488, RS-232. May be different from first set.
3. Automatic AC power control for printer.
4. 220 volt, 50-60 Hz. operation.

Other configurations available upon request.

The Print Buffer is a communications processor containing a microprocessor, ROM, 16K or 32K RAM, and parallel and/or serial I/O ports. The host computer(s) and printer(s) are constantly monitored. Data is rapidly accepted from the host(s), stored in an appropriate FIFO stack, and outputted from the appropriate stack when a printer requests a new line. In buffers with more than one input port, storage is dynamically allocated between users such that the faster user gets more storage. A special command code allows users to program the buffer. In program mode, data (object code) is received and stored in RAM, but the data is not outputted to a printer. Control is passed to the object code now residing in RAM. Suggested uses include code conversions, e.g. conversion of ASCII to IBM correspondence code to drive Selectrics, or the equivalent of PRINT programs of a word processor that prepares edited files for printing.

Having used the Print Buffer in my day to day operations, I am impressed with the time it saves my operators. The program that we use for general ledger posting first prints the ledger information and then posts the information by storing it on disk. Using the Print Buffer, the information is quickly transferred from the CPU to the Buffer. Before the printer stops printing the posting is usually completed. That means my girls don't waste a lot of time waiting on the line printer and then again on the posting. Both operations are usually done simultaneously. The Buffer handles the printer, my girls handle inputting information — and now they don't waste time in the process.

Graham C. Bethel
Certified Public Account

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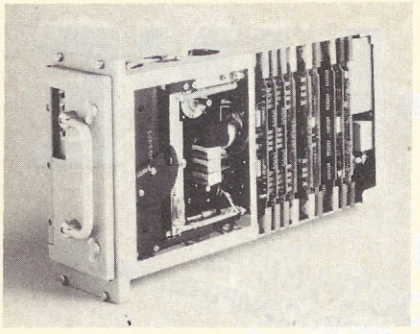
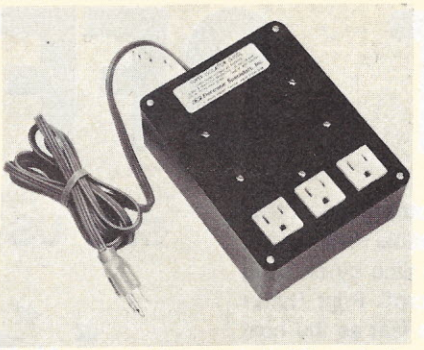
include an extender card for circuit board access during operation. Genisco Systems



Div., 18435 Susana Rd., Rancho Dominguez, CA 90221, (213) 537-4750.
CIRCLE INQUIRY NO. 252

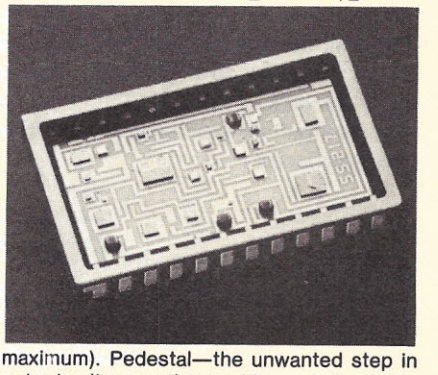
Computer pollution control is possible with Super Isolator. Incorporating heavy duty spike/surge suppression, the unit features 3



individually dual-Pi filtered AC sockets. Equipment interactions are eliminated and disruptive/damaging power line pollution is controlled. The unit will control pollution for an 1875 watt load. Each socket can handle a 1000 watt load. Price: $95. Electronic Specialists, 171 S. Main St., Natick, MA 01760, (617) 655-1532.
CIRCLE INQUIRY NO. 251

Logic test probe, Bar-Graf, is the first test instrument to combine the many functions of a digital multimeter, signal generator and oscilloscope all in one, lightweight, hand-held instrument. Not only is it able to accurately read to zero volts, but it also gives precise readings of voltages containing high noise levels, with the incorporation of a selectable input filter. An internal AC to DC converter makes possible sophisticated operational amplifier circuitry. The probe features an instant ten-segment display with no settling time. With this display you are able to measure pulse amplitudes, detecting pulses as short as 300ns. AC and DC voltages are displayed with an accuracy of 5%. The probe's active rectifier measures positive and negative with equal precision, and indicates when measuring negative. Alternating voltages are displayed as peak values with both the polarity and pulse indicators illuminated. With its built-in signal generator, the probe eliminates the need to handle more than one instrument. Use of the probe enables the user to service any brand of computer or digital device with positive and negative logic levels. Amcorp Inc., 15031 Parkway Loop, Tustin, CA 92680, (714) 731-7847.
CIRCLE INQUIRY NO. 253

Track and hold amplifier, the MN375, is ideal for high speed 13 and 14 bit applications. The four most important dynamic specifications of T/H amplifiers are acquisition time, aperture uncertainty, droop rate, and track to hold settling time. The unit acquires a full scale signal to ±0.005%FSR in 700nsec (1μsec maximum) or to ±0.01% FSR in 500nsec (700nsec maximum). Maximum aperture uncertainty of 100psec allows signals as fast as 190kHz to be accurately captured to the 13 bit level, and the MN375's low 5mV/msec maximum droop rate allows these signals to be accurately held for over 120μsec. In addition, maximum track to hold settling time is only 150nsec to ±0.005%FSR. The four most important T/H accuracy specifications are linearity, gain accuracy, offset error, and pedestal. The linearity error is guaranteed better than ±0.005%FSR over its entire −25°C to +85°C (ambient) operating temperature range, and gain accuracy is guaranteed better than ±0.05% in the same range. Offset error is a low ±1 mV (±3 mV

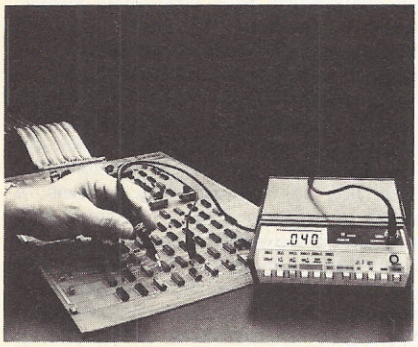


maximum). Pedestal—the unwanted step in output voltage as the amplifier switches from track to hold—is also excellent. It is guaranteed less than 10 mV over the entire

operating temperature range. Micro Networks Co., 324 Clark St., Worcester, MA 01606, (617) 852-5400.
CIRCLE INQUIRY NO. 254

LCD digital panel meter, model 380A, is housed in a DIN standard case and provides high viewing contrast with 0.5-in. LCD digits. The sharp, crisp display is highly visible in low to high ambient light conditions and is highly readable in bright sunlight conditions. The low parts count LSI circuitry coupled with low current drain display reduces power therefore internal heating, and greatly increases the MTBF of the meter. The model was designed for display-only applications and is pin-for-pin and case compatible with the model 379A and model 2570 (both LED meters). Full scale ranges available include 200mV through 200V. Power may be 110/220 Vac ±20%, 50 to 400 Hz or, if desired, 5Vdc isolated or non-isolated from signal to power supply common. The 5Vdc (non-isolated) version requires typically less than 5ma of operating current. Penril Corp., 5520 Randolph Rd., Rockville, MD 20852, (301) 881-8151.
CIRCLE INQUIRY NO. 255

Digital multimeters, MX 331 and MX 333, both provide 0.1% basic accuracy, 10 megohm input impedance, and excellent overload protection. The 333, contains Vari-Pitch, a built-in audible signal that changes



frequency proportionate to digital readings, and Logi-Trak, a self contained logic testing capability that combines the features of a high performance logic probe and voltmeter in one convenient function. The multimeters are designed to provide maximum accuracy and convenience when used on a bench, in the hand or even attached to one's belt. Their rugged construction, with suspended PC boards in a high impact plastic case, compact size and unique sloped display make this possible. Belt clips are furnished with the units to facilitate usage in walk around and two hands on applications. Safety test leads plug into the side so they are out of the way and resist pull out. Prices: the 331 is $179; the 333 is $235. Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, OH 44108, (216) 541-8060.
CIRCLE INQUIRY NO. 256

Transient eliminators for RS232/computer peripheral equipment are equipped with the 25 pin DB-25 type connectors on both the line and protected sides, female or male, as required. Designed for hardwired data line circuits or connections to modems and other computer peripheral equipment usually remote from the mainframe CPU. Standard unit's clamp voltage is ±20 volts peak at 100 ma. Other voltages and currents are available and the number of protected circuits is optional, up to 25 per connector. The model TED(4) four circuit unit sells in single quantities for $169 each. The eight

circuit module, TED(8), sells for $299 each. Lightning Elimination Assoc., Inc., 12156 Lakeland Rd., Santa Fe Springs, CA 90670, (213) 944-0916.
CIRCLE INQUIRY NO. 257

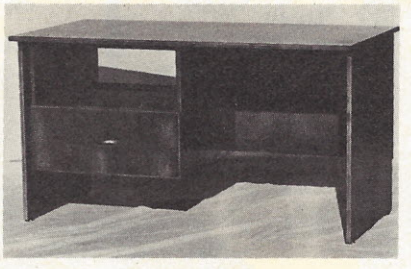
Computer desk with custom fitted areas to hold the Apple II or Apple II Plus computer is handcrafted in wood. The drawer in front is designed to hold the computer at a comfortable typing height, and a space saving custom area for the disk drives is easily accessible for loading diskettes. The drawer and disk drive area are engineered for easy air flow and cooling. The disk drive area may on request have a 4½-in. hole cut allowing installation of a muffin fan for additional air circulation. The desk has a work top area of 27 in. by 48 in. and is built to a height of 30 in. It is finished in a Salem Maple stain but can be ordered in other finishes. The desk is sealed with marproof laquer for protection. Upon request other compartments may be

custom fitted for additional equipment or drawers may be added. The back has cable cut outs. Price: $400. Furnwood Manufac-

turing, 5665 S.W. Carman Dr., Lake Oswego, OR 97034, (503) 636-1991.

CIRCLE INQUIRY NO. 258

Desks and printer stands feature hardwood with an oak or other finish. The desk is standard typewriter height and features a left or right knee-hole. It comes with one drawer, however, for table top computers, another drawer can be placed in the space provided for the computer. For computer expansion, the bottom drawer can be removed. The



printer stand is designed to permit the computer operator to observe the printing function clearly, without the need to stand up. In addition, it is on casters, for easy mobility. A pull-out paper catcher is included with the unit. Abacus Cabinet Systems, 543-B W. Betteravia Rd., Santa Maria, CA 93455, (805) 928-4551.

CIRCLE INQUIRY NO. 259

Text processing program, Word-M3, accepts lines of text interspersed with lines of format control information and formats the text into a document. It is easy to use, having only 19 commands. Any organization whose business involves some documentation will find it invaluable. It can prepare letters, memos, manuals, reports, and even books. Commands let you set page length, line width, skip pages and text, indent, center text etc. Line spacing, filling, adjusting, margin right justification and page numbering are automatically controlled. Price: $49. Micro Architect Inc., 96 Dothan St., Arlington, MA 02174.

CIRCLE INQUIRY NO. 260

Word processing program in 8K and 16/32K versions, is now used extensively for expanding the capabilities of Commodore Pet microcomputers. The program permits composing and printing letters, flyers, advertisements, manuscripts, and other documents using the Pet and a printer. One of the printers most widely applied is the versatile NEC Spinwriter interfaced to the Pet with a CmC ADA1600 or ADA1450 IEEE-488 adapter. The software incorporates print directives including line length, line spacing, left margin, centering, and skip. Edit commands allow the operator to insert lines, delete lines, move lines and paragraphs, change strings, save files onto cassettes, load files from cassette, move up, move down, print, and type. The system can be

modified for disk storage. Added features for the 16/32K version include string search for editing, keyboard entry during printing for letter salutations, justification, and multiple printing. The 8K version lists for $29.50; the 16/32K version is priced at $39.50. WPP, Connecticut Microcomputer, 34 Del Mar Dr., Brookfield, CT 06804.

CIRCLE INQUIRY NO. 261

The Benchmark word processing system especially designed for users of small business and personal computers, is not limited to one type of word processing. It provides the flexibility to draft and edit letters, financial statements, statistical tables, manuscripts, operating manuals, literature, legal documents, and forms. Features include: use on multi-operating systems, a variety of terminal drivers delivered with each system, the ability to use all the features of the video terminal and the printer, overtype, decimal tab, block move and get, ease of operation with menus featuring prompts in plain English. It is completely self-prompting. There are no control codes that must be memorized. All commands to the computer are simple and logical. Price: $499. R & B Computer Systems, 1954 E. University, Tempe, AZ 85281, (800) 528-7385.

CIRCLE INQUIRY NO. 262

Integrated accounting system, Business Manager, for the series 5000 multi-tasking microcomputers tracks sales, performs accounting functions and keeps inventory up-to-date with a minimum of effort. It provides historical data and reports for planning and analysis. It automatically handles data transfers, updates receivables with sales information, updating inventory when parts are required for an order, and automatically updating the general ledger for all activities that effect it. There are six accounting modules: sales order entry, accounts receivable, inventory control, general ledger, accounts payable and purchase order management. A customer inquiry module gives quick access to credit and client information, and can be used in conjunction with the word processing package to quickly create customer mailings for promotion of new products or pursuing collections. A security management system controls access to programs and files by assigning one of three levels of activity for each operator and for each program module. Thus, sensitive

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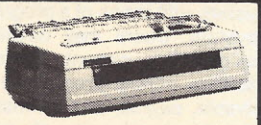
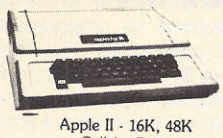


NEC spinwriter
5510-5530 - **$2395**



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data is fully protected from unauthorized inquiry or change, but normal operation is not inhibited. The system is fully menu driven, and includes a 'help' option, that displays tutorial information on the operator's screen when that option is selected. Dynabyte, 115 Independence Dr., Menlo Park, CA 94025, (415) 329-8021.

CIRCLE INQUIRY NO. 263

Backgammon software, BKG 10.0, was coded directly in Z-80 assembler. It can make most moves in from 10 to 15 seconds, but playing speed varies directly with the complexity of the position and the number of possible legal plays. It has been programmed for doubling and match play and can be used as a learning aid when asked to recommend a move or doubling decision. A further difference between this game and similar computer games is its use of SNAC functions. An artificial intelligence technique applies Smooth, Nonlinear Application Coefficients to evaluation functions used in determining the best play. In this way, fine distinctions can be drawn between similar board positions which in reality make big differences in the proper strategic approach. The program uses direct cursor control to build the image of a backgammon board on a CRT screen and to display game status information. The player may elect to roll his own dice or to have BKG 10.0 generate random dice for him. An enhanced version allows archiving to diskette or printer and nonstandard board initialization and replay. These capabilities allow true computer simulation exercises to be performed. Intelligence Systems Limited, 124 S. Delaware St., Indianapolis, IN 46204, (317) 631-5514.

CIRCLE INQUIRY NO. 264

Gameware series features high-quality computer games that are attractively packaged and suitable for use on several personal microcomputers. The first three games are: Reversal, winner of the software division of the First International Man-Machine Othello Tournament; Blackjack Master, a game that

allows players to test their betting and playing abilities over thousands of games in minutes; and the famous Sargon II chess game. The games are packaged with four color art, shrink-wrapped, and fully documented. Hayden Book Co., 50 Essex St., Rochelle Park, NJ 07662.

CIRCLE INQUIRY NO. 265

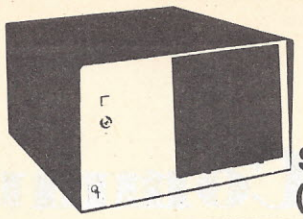
Multitasking operating system for Dynabyte series 5000 microcomputers, the DOS level 4, is CP/M and MP/M compatible, and available with 5¼-in. and 8-in. diskette storage; Winchester disk drives with capacities of 9, 27 or 45M-bytes; and cartridge module disks with storage capacities of 32, 64 or 96M-bytes. The operating system can handle up to 8 terminals and 16 printers, and any single terminal can run up to 8 simultaneous jobs. Any printer can be accessed from any terminal, and each terminal can have its own spooler or can share a single system spooler. Memory capacity is 400K bytes, usually organized into 7 partitions of 48K bytes each and an eighth partition of 32K bytes. Interfacing software for attachment of terminals, printers and disk drives has been implemented, and a driver for an auto-answer modem is included as standard. The system supports MBasic, CBasic, Cobol, Fortran, Pascal and PL/1. Dynabyte, 115 Independence Dr., Menlo Park, CA 94025, (415) 329-8021.

CIRCLE INQUIRY NO. 266

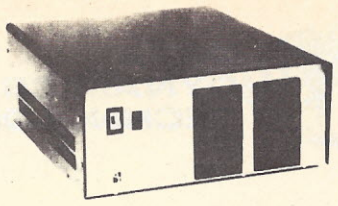
Information management system, Prism, for CP/M integrates features of a data base management system with those of a program development system. Users may develop applications like mail lists, patient records, or real estate listings without programming. Accounts receivable, payroll, and inventory control may also be developed with less effort and cost. Offered in two versions—the first is Information Management System, designed for users with little or no computing knowledge. It requires no programming in order to develop applications. The Application Development System is designed for the more knowledgeable user with some programming experience. It provides a generalized data management language, user-definable menus and password protection of sensitive functions and files. Both run on microcomputers using CP/M and CBasic-2 with 48K memory or more. Micro Applications Group, 7300 Caldus Ave., Van Nuys, CA 91406, (213) 881-8076.

CIRCLE INQUIRY NO. 268

COMPUTER SYSTEMS INC.
15620 South Inglewood Avenue
Lawndale, California 90260
(213) 970-0952



SYSTEM+ (8")



MINI-SYSTEM+ (5¼")

QT SYSTEM +

The QT System+ is designed for both businessmen and engineers in accordance with the latest IEEE standards. Among other functions, it can be used for accounting and word processing, as well as a variety of scientific applications. The system will soon be available with MP/M® to allow multiuser, multi-tasking operations. This means, for example, that an engineer could be working on scientific applications in the lab while an accountant is writing payroll checks in the office. QT also offers a full line of business and applications software, ranging from a business package to word processing.

Technical specifications: 4MHz Z-80A CPU • Dbl-sided, dbl-den. 5¼" & 8" floppy disk controller (handles both drives simultaneously) • Two 8" dbl-den., sgl. or dual sided disk drives, expandable to 4 floppy drives • CP/M® 2.2 included • 64K RAM • Comes complete in single mainframe • EPROM/ROM in any combination to 8K • Two RS232C serial I/O ports • Two parallel I/O ports • Hard disk compatible • Real time clock • Std. 2K monitor program & disk routines included on ROM • Power-on/Reset jump to monitor program • 2716 (5V) EPROM programmer (software incl. on monitor ROM)(ext. 25.5V @ 50ma req.) • Uses Z-80A CPU vectored interrupts • Assembled, tested & burned •Documentation included.

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SYSTEM + I (1MB+)

SYS+SS Computer System with 8" Single Sided Drives (801R) without Terminal

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A&T (12 slot)	**$3795.00**

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SYS+DS Computer System with 8" Dual-Sided Drives (Qume DT-8) without Terminal

A&T (6 slot)	**$4495.00**
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A&T (12 slot)	**$4695.00**

MINI-SYSTEM + I (½MB+)

Computer System with 5¼" Single Sided Drives (uses B-51 Disk Drives) No Terminal

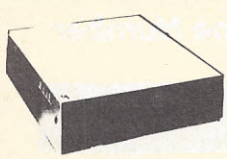
A&T (6 slot)	**$2495.00**
A&T (8 slot)	**$2595.00**
A&T (12 slot)	**$2695.00**

MINI-SYSTEM + II (1MB+)

Computer System with 5¼" Double Sided Drives (uses B-52 Disk Drives) No Terminal

A&T (6 slot)	**$2795.00**
A&T (8 slot)	**$2895.00**
A&T (12 slot)	**$2995.00**

DISK DRIVE PRODUCTS



QT DISK PACKAGES

DDC-88-1 Dbl Den Controller, A&T, two 8" dbl den drives (801R) CP/M® 2.2,cabinet, power supply & cables ..... **SPECIAL $1495.00**

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DDC-88-3 Cabinet with power supply, fans & cables ..... **$ 275.00**

DDC-88-4 Cabinet only ..... **$ 75.00**

DISK DRIVES

8"

Shugart 801R Sgl/Sided Dbl/Den ..... **$ 450.00**

Qume Datatrak 8" Dbl/Sided Dbl/Den
QME-8DS (851R) compatible ..... **$ 650.00**
Pkg of two **$1250.00**

5¼"

MPI-B51 MPI B-51 ..... **$ 235.00**
Sgl Sided Sgl/Dbl Den

MPI-B52 MPI B-52 ..... **$350.00**
Sgl Sided, Dbl Den

MPI-B91
MPI B-91 ..... **$ 375.00**
Sgl Sided, Dbl Den, 77 tracks

Shugart SA400 SHU-SA400 ..... **$ 250.00**
Sgl Sided, Dbl/Den

S-100 PRODUCTS

Double Density - Cal Comp Sys
5¼" or 8" disk controller with free CP/M 2.2
CCS-2422A A&T **$374.95**

Expando RAM II - SD Systems
4 MHz RAM board expandable from 16K to 256K
SDS-RAM216K 16K kit **$289.95**
SDS-RAM216AT 16K A&T **$339.95**
SDS-RAM232K 32K kit **$329.95**
SDS-RAM232AT 32K A&T **$379.95**

SDS-RAM248K 48K kit **$369.95**
SDS-RAM248AT 48K A&T **$419.95**
SDS-RAM264K 64K kit **$409.95**
SDS-RAM264K 64K A&T **$459.95**

PROM-100 - SD Systems
2708, 2716, 2732, 2758 & 2516 EPROM programmer
SDS-PROM-100K kit **$220.00**
SDS-PROM-100AT A&T **$275.00**

ITHACA AUDIO REV 2.0 Z-80 BD

Bare Board ..... **$35.00 each**
10 for $300.00

SEALS ELECTRONICS 32K STATIC BD

Uses TMS-4044 or 5257L ..... **$35.00 each**

QT MEMORY EXPANSION KITS

TRS-80 • APPLE • EXIDY

4116 200 ns ..... **8 for $32.00**
2716 (5V-450 ns) ..... **$ 9.00**
2716 (5 & 12V-450 ns) ..... **$ 9.00**
2732 (5V) **$40.00**
2114L 300 ns ..... **8 for $36.00**
100 - $3.50 ea.

PARTS

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Z80 (2MHz)	$10.95
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6800	$12.50
6802	$18.00
8035	$20.00
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8085A	$20.00
8086-4	$60.00
8088	$60.00
8748	$60.00
TMS 9900 JL	$29.95

8080A SUPPORT

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8214	$ 4.50
8216	$ 2.95
8224	$ 4.00
8228	$ 6.00
8238	$ 6.00
8243	$ 5.00
8251	$ 7.00
8253	$19.00
8253-5	$20.25
8255	$ 6.25
8257	$17.95
8257-5	$19.00
8259	$19.95
8275	$69.95
8279	$17.50
8279-5	$18.00
8295	$16.50

KEYBOARD CHIPS

AY5-2376	$13.75
AY5-3600	$13.75

BAUD RATE GENERATORS

MC14411	$11.00
1.8432 XTAL	$ 4.95

DISK CONTROLLER

1771B01	$24.95
1791B01	$37.95

EPROMS

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2708	$ 6.25
2516 (5V)	$ 9.00
2716 (5V)	$ 9.00
2716 (5 & 12V)	$ 9.00
2758	$19.95
2532	$40.00
2732	$40.00

USRT

S2350	$ 7.95

MISCELLANEOUS OTHER COMPONENTS

N8T20	$ 3.25
N8T26	$ 2.50
N8T97	$ 2.00
N8T98	$ 2.00
1488	$ 1.25
1489	$ 1.25
D3205	$ 3.00
D3242	$14.00
P3404	$ 6.75
TMS5501	$19.00
DM8131	$ 3.00

UARTS

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AY5-1013A	$ 4.50

CHARACTER GENERATORS

2513 UP CASE (5&12V)	$10.95
2513 LWR CASE (5&12V)	$10.95
2513 UP CASE (5V)	$ 9.75
2513 LWR CASE (5V)	$10.95

6800 PRODUCTS

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6821P	$ 5.25
6840P	$18.25
6845P	$22.00
6850P	$ 4.80
6860P	$11.55
6875P	$ 7.40

QT PRODUCTS

SBC+2/4 SINGLE BOARD COMPUTER

Features: 1K RAM (which can be located at any 1K boundary) plus one each Parallel and Serial I/O parts on board • Power on jump to on-board EPROM (2708 or 2716) • EPROM addressable on any 1K or 2K boundary • Full 64K use of RAM allowed in shadow mode • Programmable Baud rate selection, 110-9600 • 2 or 4MHz switch selectable • DMA capability allows MWRT signal generation on CPU board or elsewhere in system under DMA logic or front panel control • Two programmable timers available for use by programs run with the SBC+2/4 (timer output and controls available at parallel I/O connector; parallel input and output ports available for use on CPU board).

Bare Board ..... $ 60.00
Kit $190.00
A&T $295.00

Z+80 CPU

Features: Power on jump to on-board EPROM (2708, 2716 or 2732) • EPROM addressed on any 1K or 2K boundary; also shadow mode allows full 64K use of RAM • On-board USART for Synchronous or Asynchronous RS-232 Operation (Serial I/O port) • Programmable Baud rate selection, 110-9600 • Switch selectable 2 or 4 MHz • MWRITE signal generated if used without front panel • Front panel compatible.

Bare Board ..... $ 50.00
Kit $150.00
A&T $210.00

RAM+16

Features: S-100, 16K x 8 bit static RAM • 2 or 4 MHz • Uses 2114 1K x 4 static RAM chip • 4K step addressable • 1K increment memory protection, from bottom board address up or top down • Deactivates up to six 1K board segments to create "holes" for other devices • DIP switch selectable wait states • Phantom line DIP switch • Eight bank select lines expandable to ½ million byte system • Data, address and control lines all input buffered • Ignores I/O commands at board address.

Bare Board ..... $ 35.00
4Mhz Kit $190.00
4Mhz A&T $225.00

RAM+ 65

•S-100, 16K x 8 bit static RAM •2 or 4MHz •Uses 2114L (300NS) CHIP •Addressable in 4K steps •Memory protection in 1K increments, from bottom board address up or top down • May deactivate up to six 1K segments of board to create "holes" for other devices • DIP switch selectable wait states • Phantom line DIP switch •Features bank selection by I/O instruction using any one of 256 DIP switch-selectable codes—allows up to 256 software-controlled memory banks.

Bare Board ..... $ 35.00
4MHz Kit $210.00
4MHz A&T $250.00

EXPANDABLE+ REV II DYNAMIC MEMORY BOARD

NEW

Features: Runs at 4MHz • 3242 refresh controller with delay line • Four layer PC board insures quiet operation • Supports 16K, 32K, 48K or 64K of memory • 24 IEEE-specified address lines • Optional M1 wait state allows error free operation with faster processors • Optional Phantom disable • Uses Z-80 or on-board refresh signal • Bank on/off signal selected by industry standard I/O port 40 (Hex) • Convenient DIP switch selection of data bus bits determines bank in use • 3 watts low power consumption • Convenient LED indication of bank in use.

Definitely works with Cromemco and North Star

Bare Board ..... $ 75.00

KIT		A&T	
No RAM	$230.00	16K	$350.00
16K	$280.00	32K	$450.00
32K	$360.00	48K	$575.00
48K	$480.00	64K	$675.00
64K	$525.00		

CLOCK/CALENDAR+ FOR APPLE II, S-100 OR TRS-80

Features: Date/Month/Year • Day of week • 24 hour time or 12 hour (a.m./p.m.) selectable • Leap year (perpetual calendar) • 4 interval interrupt timer; 1024Hz (approx. 1 millisec), 1 sec., 1 min., 1 hr. • On-board battery backup • Simple time and date setting • Simple software interface • Time advance protection while reading.

Battery Included

S-100 or Apple		TRS-80	
A&T	$150.00	A&T Only	$150.00
Kit	$100.00		
Bare Bd.	$ 60.00		

WATCH FOR THE FOLLOWING NEW BDS:

- **4 Port Serial Bd (APR)**
- **E-PROM Programmer (MAY)**
- **Floppy Disk Controller (JUN)**
- **Hard Disk Controller (JUN)**
- **Color Video Bd (AUG)**

I/O+ INDUSTRIAL GRADE I/O BD

Has two serial Sync/Async ports (RS-232, current loop or TTL) with individual Xtal controlled programmable baudrate generators • Four 8-bit Parallel ports; one latched input port and other three can be programmed in combinations of input, output or bidirectional • Also, has three 16-bit Programmable Timers and an 8-level Programmable Interrupt Controller w/Auto restart (8080 / Z80) • Other features include; on-board clock divisor for timers, completely socketed, wire wrap posts for easy port configuration plus more.

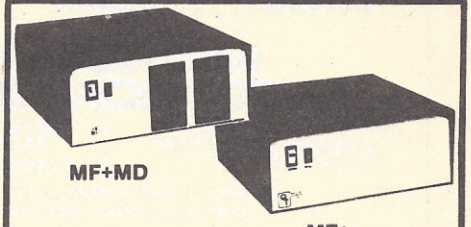
Bare Board ..... $ 70.00
Kit $200.00
A&T $375.00

SILENCE+ MOTHERBOARDS

These motherboards are among the quietest on the market. A unique grounding matrix — with each line completely surrounded by ground shielding — eliminates need for termination and gives high crosstalk rejection • They're customer-proven, without crosstalk sometimes operating at 14MHz • A LED power indicator helps eliminate zapped circuits • IEEE S-100 std. compatible, available with 6, 8, 12, 18 or 22 slots • (The 22 slot board fits Imsai chassis and has slot for front panel.)

6 Slot		12 Slot	
Bare Board	$ 25.00	Bare Board	$ 30.00
Kit	$ 40.00	Kit	$ 70.00
A&T	$ 50.00	A&T	$ 90.00
8 Slot		**18 Slot**	
Bare Board	$ 27.00	Bare Board	$ 50.00
Kit	$ 55.00	Kit	$100.00
A&T	$ 70.00	A&T	$140.00

QT MAINFRAMES



5¼" Disk Mainframe with 25A Pwr Sup

MF+MD12 (12 slot M/B) $500.00
MF+MD8 (8 slot M/B) $475.00
MF+MD6 (6 slot M/B) $450.00
MF+MD w/o M/B $400.00

Q.T. Mainframe

MF+12 (12 slot M/B) $450.00
MF+18 (18 slot M/B) $500.00
MF+22 (22 slot M/B) $600.00

MAINFRAME+ DISK DRIVE

Includes cabinet, 25 amp power supply, IEEE S-100 compatible 6, 8 or 12 slot motherboard and dual 8" disk drive with disk drive power supply.

MF+DD6 ..... $625.00
MF+DD8 ..... $650.00
MF+DD12 ..... $675.00

DDC-8 SINGLE 8" DISK CABINET

Accepts one 8" disk drive (Shugart, Remex, PerSci, Siemens, etc.) • Fan cooled, with data cable and AC line filter to eliminate EMI • Operates from 100-125VAC/200-250VAC at 50-60Hz • Disk drive NOT included.

DDC+8 ..... $195.00

QT COMPUTER SYSTEMS INC.
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BOOK REVIEWS

8080/Z80 Assembly Language: Techniques for Improved Programming

by Alan R. Miller
John Wiley & Sons, New York, NY

Reviewed by Rocky Smolin

Why should anyone want to write yet another book on the subject of Z-80 and 8080 assembly language programming? Anyone who does programming for either processor will need at least one book on the subject. Miller presumably hopes that this one book will be his.

He has good reason to believe that it will. His purpose is twofold. First, he perceived the need for a definitive reference volume on the subject. To this end, he has provided extensive and easy-to-use appendices covering each instruction for both processors in detail, as well as sorts by mnemonic and op code.

His second purpose is to educate assembly language programmers in useful techniques. Given the growing popularity of these microprocessors, one can easily foresee an enormous increase in the number of programmers required, and a corresponding increase in bad programming.

The book is organized logically starting with a thorough introduction to the inner workings of the processors—the general purpose registers, flag registers, logical, branching, and double register operations, and rotation and shifting. The next chapters present the remaining fundamental programming topics—number bases and logical operations, stack operations, input and output techniques, and the macro assembler, including how to emulate Z-80 instructions on the 8080 CPU.

Using top-down programming methods, another chapter guides the reader through the development of a small, powerful system monitor. Next, some very sophisticated topics are presented including conversion of the system monitor to Z-80 mnemonics, number base conversion and paper and mag tape I/O routines.

Another section explains how to link programs to the CP/M operating system and utilize many of its routines.

This book is for intermediate and advanced programmers, but its clarity and organization can provide even a beginning programmer with an avenue to advanced techniques.

328 pages $9.95

New Uses for the Home Computer in the Stock Market

by Thomas Lenz
Thomas V. Lenz, Elko, NV

Reviewed by Carl Heintz

This excellent book contains a detailed description of 34 programs developed by the author to analyze stock market behavior from a charting technical point of view. The programs include seasonal analysis, running averages, seasonal index trading, statistical filters, angular velocity calculations, statistical studies of price fluctuations and some utilities.

The programs use cassette tapes and a TRS-80 model I level I Basic. They are easily transcribed into the machine, and although not all programs were personally tested, no bugs were apparent. Most will run on a 4K machine, but 16K is recommended.

To effectively use these programs, there will be a lot of key punching. Each stock must have at least up to 126 prices entered for a statistical analysis. However, once the data base is started, all that is needed is an occasional update. The power of the packages offered is impressive. They seem sound from a statistical basis, and would be the answer to a need for the technical analyst. Lest the reader assume that

they are too complex, Lenz took great care to discuss the theory behind his programs. The explanations alone constitute an interesting insight into one man's methodology of picking stock market winners.

The book fills a void for the investor in effectively utilizing the computer as a predictive tool in stock market behavior. By no means are the programs the solution but they offer an insight into one philosophy of utilizing a micro to achieve success in investing. It can be ordered directly from the author at 596 W. Karval Ct., Spring Creek, Elko, NV 89801.
253 pages $19.95

Using CP/M: A Self-Teaching Guide
by Judi N. Fernandez and Ruth Ashley
John Wiley & Sons, New York, NY

Reviewed by David Civan

Developed and distributed by Digital Research for use with computers based on 8080, 8085, and Z80 microprocessors, CP/M is the most widely used disk operating system for microcomputers. This book is a tutorial intended for the CP/M user. Although the authors assume the reader already possesses both microcomputer and CP/M software, the book can aid prospective users by better acquainting them with the system before they buy it.

It is a "self-paced" tutorial; after each short explanatory section, the reader must answer a few questions. If the reader answers correctly, the next section can be attempted. If, however, the reader answers incorrectly, the section can be re-read until the material is better understood. While this format effectively prevents novices from becoming totally confused, some readers may find the questions unchallenging and annoying. These readers may instead proceed more rapidly, checking themselves with the chapter tests.

The text covers CP/M syntax, disk commands, programs usually supplied with CP/M, status commands, copying commands, editing, and file submission (the last being a small-scale batch processing system). The material is current with CP/M version 2.0. Differences among the various extant versions are mentioned, and only features common to all CP/M systems are included.

My only reservation involves the typography. No differentiation is made between user and computer messages in the displays, and answers to questions are unclear—printed with prompts when prompts are included in the question blanks. Punctuation that is totally irrelevant to the answers is also included—resulting in confusion. Overlooking these drawbacks, the book is an excellent tutorial.
243 pages $8.95

Introduction to Pascal
by Rodnay Zaks
Sybex, Berkeley, CA

Reviewed by David Marca

Those who pick up this book will immediately find its organization a little different from the usual programming language book. This refreshing presentation of material meets one of the book's major goals in developing Pascal language concepts from simple to complex. Also provided are clearly isolated discussions of UCSD implementation anomalies of the language.

The technical coverage of the language is quite complete, with files, sets, and lists getting a just treatment. One caution:

BOOK REVIEWS

"Standard Pascal" is defined as the Jesen and Wirth version, and has nothing to do with current proposed Pascal standards. Fully developed programs exemplify the technical concepts being presented. The programs are general in nature, and are not tailored to any single audience.

Figures are numerous and of good quality. They add to the concepts and are not just mimics of the text. Periodically, they are very helpful to the reader, like a Pascal program organization map and syntax diagrams.

Another major goal of the book was to be a reference text. Its appendix is composed of ten sections of technical summaries, including UCSD intrinsics, Pascal identifiers and Pascal operators. Other summary tables appear within the text, such as identifier scope rules. There is also an index to illustrations and programs that the reader will find useful.

The shortcomings are few, but important to note. The programs presented lack a consistent style. Many were also typeset from what appears to be working code. The reader should be prepared for some debugging if they are entered onto a system. The chapter on the program development process and style doesn't do either topic justice.

All in all, the book is recommended as a tutorial treatise on Pascal. It will be especially useful to those working with the UCSD version, for it is much clearer than the UCSD reference manual on several counts.

320 pages $12.95

Computer Security: A Management Audit Approach

by Norman L. Enger and Paul W. Howerton
Amacom, New York, NY

Reviewed by Bernard Conrad Cole

Computers—and their security—have become vital to the daily operations of large organizations in both the private and public sectors. Security and privacy have developed into major problems for managers who are concerned about their organization's exposure to such computer-related crimes as fraud, theft or manipulation of information and vandalism. This book is intended for those managers whose specific duties are to deal with threats to the security of their computer based information systems.

Unlike most books on this subject, this one attempts to offer specific information on how to decide which protective measures to invest in, assessing the consequences of the loss of information assets. Checklists covering the more important areas of computer operations—personnel, system development, input controls, on-line processing, software, output controls, operations environment, physical security and audit procedures—are provided to help the manager evaluate the exposure of his organization to these threats.

This is not a book for the uninitiated in either computers or computer security. Despite its complexity, it will be a rewarding investment for the manager seriously interested in computer security.

264 pages $21.95

The Effective EDP Manager

by Michael R. Frank
Amacom, New York, NY

This book is intended for professionals with EDP management responsibility. Within those limits, it is a uniquely effective solution-oriented book. It prescribes practical approaches to all the important areas of EDP management. It reviews the recent history, current status, and future of EDP organizations and discusses the basic responsibilities of the manager.

The underlying assumption is that despite phenomenal accomplishments, commercial EDP organizations have not

taken full advantage of the potential that technology provides. The basic theme is that effective management techniques are needed to close the gap between potential and performance.

In order to accomplish this, says Frank, EDP managers must acquire or improve their basic management skills, adapt them to fit their particular environment, and relay primarily on those skills to manage the department.

The book provides "real world" insight into the approaches that will be successful, their justification and some practical questions normally not addressed in this type of work. Ways to control the EDP department are followed by ways to manage its human and hardware resources. Planning is discussed next, after which comes a useful way to measure performance throughout all departments.

Although no dramatically new concepts or solutions are offered, the techniques are presented in a clear and coherent manner and should result in an improvement of the data processing function.

197 pages $17.95 ***—BCC***

RECENT BOOKSHELF ADDITIONS

Experimenting with MSI, LSI, IO and Modular Memory Systems
by Charles W. McKay 272 pages
Prentice-Hall, Englewood, NJ $19.95

The Dartmouth Time Sharing System
by G.M. Bull 240 pages
John Wiley & Sons, Somerset, NJ $65

Small Business Computer Evaluation Program
Business Systems Research Group, 200 pages
Dallas, TX $29.95

Musical Applications of Microprocessors
by Hal Chamberlin 688 pages
Hayden Book Co., Rochelle Park, NJ $24.95

Personal Computer Word Processing
by Larry Press 21 pages
Small Systems Group, Santa Monica, CA $10

The Creative Kid's Guide to Home Computers
by Fred D'Ignazio 130 pages
Doubleday Books, New York, NY $9.95

Conversational Languages
by I. Kupka and N. Wilsing 117 pages
John Wiley & Sons, Somerset, NJ $27.75

Pet/CBM Personal Computer Guide
by Adam Osborne 500 pages
Osborne/McGraw Hill, Berkeley, CA $15

Mostly Basic: Applications for your TRS-80
by Howard Berenbon 168 pages
Howard W. Sams, Indianapolis, IN $10.95

Fifty Basic Exercises
by J.P. Lamoitier 231 pages
Sybex, Berkeley, CA $12.95

CALENDAR

May 1-2 Computers in Education Conference, Seattle Pacific University, Seattle, WA, panel discussions, talks, workshops, and exhibits. Jerry Johnson, Seattle Pacific University, Seattle, WA 98119.

May 5-8 PICA '81, Marriott Motor Inn, Philadelphia, PA, conference on power industry computer applications. T.A. Suman, Philadelphia Electric Co., 2301 Market St. N3-1, Philadelphia, PA 19101, (215) 841-6397.

May 10-13 European Consumer Electronics Show, Nuremburg Fair Centre, Nuremburg, W. Germany, exhibitors from all over the world, including U.S., Japan, Europe, and the Far East, offer a complete range of electronic equipment for business and consumer use. Tom May, Industrial and Trade Fairs, Ltd., Radcliffe House, Bleaheim Ct., Solihull, West Midlands B91 2BG, England, (021) 705-6707, Telex: 337073.

May 13-16 International Business Show, Tokyo International Trade Fair Grounds, Harumi, Tokyo, Japan, displays of business machines and equipment including desktop calculators, electronic cash registers, data processing machines, peripherals, filing systems, facsimiles and other communication systems and equipment. Nippon Administrative Mgmt., Seikyo Kaikan Bldg., 1-13, Sendagay 4-chome, Shibuya-ku, Tokyo, Japan, (03) 403-1331.

May 15-16 S. California Micros in Education Conference, Bloomington High School, Bloomington, CA, for teachers of grades K-12, all areas of the curriculum will be covered, including reading, math, science, language, multicultural, special education, and classroom management. Forrest Miller, San Bernardino County Schools, 602 S. Tippecanoe, San Bernardino, CA 92415.

May 20-22 Videotex '81, Royal York Hotel, Toronto, Canada, first opportunity to see the world's major videotex systems in action in one place at one time, reviewing developments in the U.S., Japan, Canada, South America, Britain and France. Videotex '81, 316 Lonsdale Rd., Suite 3, Toronto, Ontario, Canada M4V 1X4, (416) 598-1981.

May 22-24 TRS-80 Microcomputer Show, Statler Exposition Center, New York, NY, commercial exhibits of manufacturers, distributors and retailers of TRS-80 related equipment for the models I, II, III color and pocket computers. Kenneth A. Gordon, Kengore Corp., 3001 Route 27, Franklin Park, NJ 08823.

May 26-29 Korea International Office Management Exposition, Exhibition Center, Seoul, Korea, computers, facsimile systems, copiers and duplicators. Clapp and Poliak, Int'l., 7315 Wisconsin Ave., Washington, D.C. 20014, (301) 657-3090.

Jun 2-4 Europe Software Fair, Magriethall of the Royal Netherlands Industries Fair, Utrecht, The Netherlands, exhibitions and seminars on all types of computer software, system design, service bureaus, suppliers. Royal Netherlands Industries Fair, Box 8500, 3503 RM Utrecht, The Netherlands.

Jun 6-7 Applefest '81, Plaza Castle, Boston, MA, full scale computer show devoted exclusively to Apple computer equipment, including systems, support equipment, software, publications and services. Sponsored by Apple/Boston, the

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- Disk II 455.00
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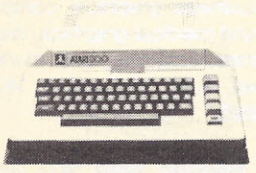
- Integer Firmwar 152.00
- Applesoft Firmw ... 152.00
- Communications ... 179.00
- Silentype 519.00
- Sup R Mod 29.00

NORTHSTAR HORIZON II
- 32 K Dual Density $2295.00
- 32K Quad Density . 2695.00
- 32 K Ram 450.00

ATARI 800 Personal Computer
16K Color

$785



Includes: Computer, basic cartridge, programming manual, operators manual, RF Mod/Switch.

VIDEX VIDEOTERM
80X24 Display
$279

9X12 Dot Matrix with upper and lower case and graphics capability. Use with Z80 business software on your Apple with the Z80 softcard

CCS GPIB IEEE (488) Interface Card
MODEL # 7490
$249

Up to 15 interconnected controllers, talkers, and/or listeners can be interfaced. Controls counters, signal generators, digital Multimeters, color graphics ETC. Includes 3 FT cable.

CCS S100 Z80 CPU
MODEL # 2810A
$249

On board serial I/O, on board 2K Rom monitor, power on jumps, full buffering of data and address lines. Assembled and tested.

CCS Apple Boards
- 7114A 12K Prom . $ 69.00
- 7424A Cal/Clock 99.00
- 7440A Prog Timer .. 89.00
- 7470A A/D Conv 95.00
- 7710A Serial Asyn . 129.00
- 7712A Serial Sync . 149.00
- 7720A Parallel 99.00
- 7728A Centronics ... 99.00
- 7811B Arith Proc .. 325.00

MICROSOFT 16K RAMCARD
$159

Add 16K of Ram to your 48K apple. Use it to load Intger, Applesoft or MBASIC. Perfect for use with the Z80 softcard and MBASIC.

Mountain Computers Inc
- Romplus $169.00
- Romwriter 149.00
- Music System 495.00
- Apple Clock 249.00
- 100K Day Clock ... 309.00
- Introl System 244.00
- X/10 Control 179.00

ABT 10 Key Pad $115.00
ABT Bar Wand $175.00
DC Hayes Mod II $335.00

Research Science Inc Peachtree/40 Software
- General Ledger ... $219.00
- Accts Receivable ... 219.00
- Accts Payable 219.00
- Payroll 219.00
- Inventory 219.00
- Mailing List 219.00

Personal Software for Apple II
- Visicalc $115.00
- CCA Data MGT 84.00
- Desk Top Plan 84.00

Hewlit Packard
HP85 Desk Top Computer
$2650

Self contained unit includes: Console, CRT, Printer, Tape Recorder. Comes with BASIC and is compatible with a variety of HP peripherals. Call or write for more information.

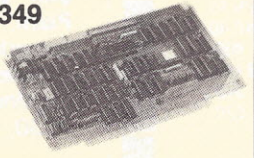
APPLE II Software
- Apple Adventure ... $22.00
- Apple Bowl 15.00
- Shell Games 27.00
- Dos 3.3 ..... 55.00
- Dos Tool Kit 70.00
- Apple Fortran 175.00
- Apple Pilot 135.00
- Apple Plot 70.00
- The Cashier 199.00
- the Controller 550.00
- Apple Writer 59.00
- Tax Planner 109.00

MICROSOFT Z80 SOFTCARD
with MBasic and CP/M
$259

Now you can run Z80 or 8080 software on your apple. Includes card, Diskette, and manuals for the CP/M and MBASIC.

CCS S–100 FLOPPY DISK CONTROLLER
MODEL 2422A

$349



Supports up to four drives in any combination of 5" and 8" single- or double-sided drives, reads and writes soft-sectored diskettes formatted to the IBM* standards for single- and double-density diskettes, and come fully supported with Rom-Resident firmware and a copy of CP/M* 2.2 on disk.

MICROMATION S100 Z80 CPU With 64K Memory
$1895.00

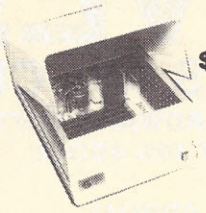
Use multiple CPU'S in a single S100 mainframe to provide each user with a dedicated CPU with 64K of memory.

TELEVIDEO CRT
MODEL # 920C
$895.00

Scotch Diskettes
Box of 10
Soft, 10 or 16 Sector

5 ¼" o, 10 or 16 ..... $27.00
8" SS/SD o Sec. 31.00
SS/DD 0 Sec. 37.00
DS/DD No Sec. 44.00
5 ¼" Sleeves (10) $6.95

CCS S100 MAINFRAME
MODEL # 2200



$374

12 Slot Mother Board, Active Ternination, card guides, Power Supply with +&-16V & 4 AMPS and 8V & 20 AMPS, assembled and tested.

TARBELL S100 Z80 CPU
WITH MEMORY MANAGEMENT
$399.00

Dynamic mapping of logical to 1 megabyte of physical memory in 4K blocks. Designed to implement multiuser operating system such as the MP/M. Includes two serial I/O ports.

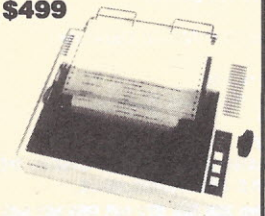
CCS Intergrated Computer
MODEL # 2210A
$1799

Mainframe, Z80 CPU, 64K memory, Disk Controller, RS232 cable, flopy disk cables, CP/M2.2. Integrated, tested and shipped with cables installed.

TARBELL S100 BOARDS
32K Static Ram
Floppy Disk Interface $649.00
Double Density $445.00

EPSON MX80 PRINTER
DOT MATRIX

$499



9X9 Dot Matrix printhead offers 40, 60, 80, 132 column with multiple Font capabilities. 50 million character life printhead can be replaced for less then $30. Requires parallel interface.

Epson/Apple MX80 Interface $99

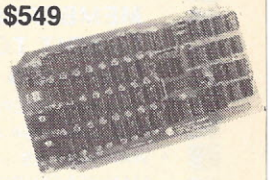
TEXAS Instrument Printer
MODEL # 820 R/O
$1795.00

CORVUS HARD DISK
10 MEGABYTE
$4350

Winchester drive for Apple or S100 computer. Please specify.

CCS S–100 64K Dynamic Ram
MODEL 2065A

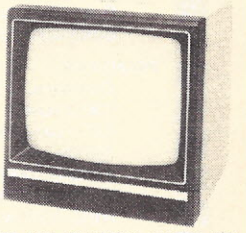
$549



The 2065 provides your S 100 system with 64K of fast, reliable memory. Compatible with the IEEE proposed STD. Features 4116-Type dynamic rams, use with A 4 MHZ CPU.

CCS S–100 Boards
- 2032A 32K Static Memory $544.00
- 2501A Motherboard ... $109.00
- 2710A 4-Port Serial ... $260.00
- 2718A Serial/ Parallel Interface $275.00
- 2720A 4-Port Parallel I/O $194.00

SANYO 12" Green Screen Monitor
FUTRA PRICE $269



800 Line Resolution monitor with green phosphoric screen for pleasant viewing. Perfect for new 80 by 24 video boards.

Sanyo 9"
B&W Monitor ... $190.00
Leedex 12"
B&W Monitor ... $155.00

Shugart Associate 801/R Disk Drives
INCLUDES: Power Supply, Case, Cable, and Documentation.

1 DRIVE $795.00
2 DRIVES $1195.00

TRADEMARKS
CP/M–Digital Research
Apple II-Apple Computer Inc.
Peachtree- Retail
Sciences Inc.

Mail Order Terms of Sale: Price based on prepaid orders. NO COD's. Visa or Master Charge orders add 3% to purchase price. Allow 14 working days for personal and company checks to clear. Order under $100.00 add $3.00 for shipping and handling. All orders (unless specified in ad) within Continental U.S. shipped U.P.S. no charge. APO or out of Continental U.S. write or call for shipping charges. All prices subject to change and all offers subject to withdrawl without notice. CA residents add 6% sales tax.

CALENDAR

Boston Computer Society's Apple user group. Gail Konchagulian, Boston Computer Society, Three Center Plaza, Boston, MA 02108, (617) 367-8080.

Jun 6-9 Atlanta Small Computer Show, Hilton Hotel, Atlanta, GA, exhibitions of small computers, peripheral equipment, supplies and services. Atlanta Small Computer Show, 4060 Jancie Dr., Suite C-1, East Point, GA 30344.

Jun 10-13 International Motorcon '81, Conrad Hilton Hotel, Chicago, IL, practical sessions, tutorials and panel discussions on components and electronic motion control. Motorcon '81, P.O. Box 2889, Oxnard, CA 93030, (805) 985-1595.

Jun 15-18 National Computer Graphics Conference, Convention Center, Baltimore, MD, tutorials, meetings, and exhibits on business graphics, computer mapping, financial, educational, and medical graphics, design, software and database, telecommunications, and marketing graphics. NCGA, 2033 M Street, N.W., Suite 330, Washington, D.C. 20036, (202) 466-5895.

Jun 16-18 Nepcon East '81, New York Coliseum, NY, spotlighting the East coast electronics manufacturing industry with 375 displays on manufacturing techniques, new methods and cost-saving developments. Industrial & Scientific Conference Management, 222 W. Adams St., Chicago, IL 60606, (312) 263-4866.

Jun 22-26 Structural Dynamics Seminar, Sheraton Plaza, Los Angeles, CA emphasizing discrete methods, numerical methods and structural modeling for computer-oriented solutions to various structural dynamic problems. Continuing Education Institute, 10889 Wilshire Blvd., Suite 1030, Los Angeles, CA 90024, (213) 477-8379.

Jun 22-27 Engineering Management Seminar, Sheraton Hotel, Washington, D.C., eight self-contained sub-courses of interest to engineers who are assuming broader managerial responsibilities. Continuing Education Institute, 10889 Wilshire Blvd., Suite 1030, Los Angeles, CA 90024, (213) 477-8379.

Jun 24-26 Computer Industry Trade Expo, Convention Center, Atlantic City, NJ, all aspects of computer hardware represented including micro and mainframes, peripherals, software and services. CITE, 110 Charlotte Place, Englewood Cliffs, NJ 07632.

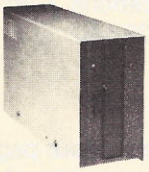
Jul 2-4 Science and Technology Exhibit, Adam's Mark Hotel, Houston, TX, exhibits by industrial, educational and research organizations concerned with energy advancements through technology. Tony Hill, CET, Houston Engineering and Scientific Society, 2615 Fannin St., Houston, TX 77002.

Jul 19-24 National Computer Camp, Grand View Lodge, Moodus, CT, recreational and educational weekend for youngsters with emphasis on computer technology. Additional session held July 26-31. Computer Camp, Grand View Lodge, Box 22, Moodus, CT 06469.

Jul 29-31 1981 Microcomputer Show, Wembley Conference Centre, London, England, seminars and exhibitions covering various aspects of the use of microprocessors in business and manufacturing. Technology Marketing and Analysis Corp., 680 Beach St., San Francisco, CA 94109.

WE WILL NOT BE UNDERSOLD

DISK DRIVES



FOR TRS-80* Model I

CCI-100 TEAC	5¼", 40 Track (102K)	**$314**
CCI-100 MPI	5¼", 40 Track (102K)	**$319**
CCI-280	5¼", 80 Track (204K)	**$429**

ADD-ON DRIVES FOR ZENITH Z-89

CCI-189	5¼", 40 Track (102K)	**$394**
CCI-289	5¼", 80 Track (204K)	**$499**
Z-87	Dual 5¼" system	**$995**

External card edge and power supply included. 90 day warranty/one year on power supply.

RAW DRIVES 8" SHUGART 801R **$425**
5¼" MPI, TEAC or TANDOM **$ CALL**

MORROW DESIGNS/THINKER TOYS™

DISCUS 2D	1 DRIVE	**$ 938**	2 DRIVE	**$1635**
DISCUS 2+2	1 DRIVE	**$1259**	2 DRIVE	**$2245**
DISCUS Hard Disk	M26	**$3990**	M10	**$2999**

DEI CARTRIDGE TAPE BACK-UP

For your hard disk. With either S-100 control card or piggy back board for single board Z-80 computers. ~~$3500~~ **$2995**

DISK OPERATING SYSTEMS

PATCHPAK #4	by Percom Data			**$8.95**
CP/M®	for Model I, Zenith	**$145**	for Model II, Altos	**$ 169**
NEWDOS	Plus 40track	**$ 79**	**NEWDOS 80**	**$ 135**

DISKETTES — Box of 10 with plastic library case

5¼"	**Scotch**	**$35**	**Maxell**	**$40**	**BASF/Verbatim**	**$24**
8"	**Scotch**	**$50**	**Maxell**	**$55**	**BASF/Verbatim**	**$36**

CLEAR PLASTIC CASE–Holds 50 5¼" diskettes **$19**

COMPLETE SYSTEMS

ARCHIVES				**$ CALL**
ALTOS	ACS8000 Series			**$ CALL**
APPLE	II-16K	**$1075**	III-96K	**$3749**
	Call for other Apple products			
TRS-80*	II-64K	**$3499**	III-16K	**$ 899**
ZENITH	48K, all-in-one computer			**$2395**
ZENITH	Z-19			**$ 795**
TELEVIDEO	920C	**$ 748**	950	**$1049**
IBM	3101 Display Terminal			**$1195**
ATARI	400	**$ 479**	800	**$ 795**
APF	Game Only	**$ 95**	System	**$ 489**
MATTEL	INTELLIVISION			**$ 229**
Used TRS-80* Model I Computers, tested and guaranteed				**$ CALL**

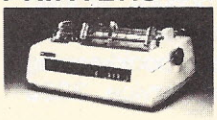
MONITORS

APF	9" B & W TVM-10		**$120**
BELL & HOWELL	9" B & W BHD911		**$220**
LEEDEX	12" B & W **$129**	13" Color	**$389**
SANYO	9" B & W VM4509		**$155**
SANYO	12" B & W DM5012		**$226**
SANYO	12" Green Screen DM5112		**$238**
SANYO	13" Color DMC6013		**$416**
ZENITH	13" Color		**$379**

TELECOMMUNICATIONS

LIVERMORE STAR MODEM 2-year guarantee	**$145**
UNIVERSAL DATA SYSTEMS UDS-103	**$179**
D-CAT HARD WIRED DIRECT MODEM	**$189**
AUTO-CAT Auto Answer, Direct Connect Modem	**$249**

PRINTERS



NEC Spinwriter
Letter Quality High Speed Printer

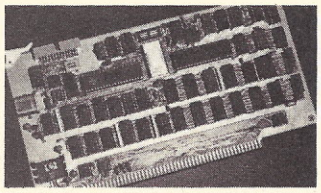
R.O.	**$2395**
R.O. with tractor feed	**$2595**
KSR with tractor feed	**$2895**

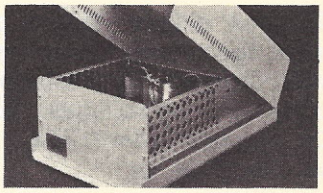
C.ITOH	Starwriter	**$1795**	Starwriter II	**$1995**
EPSON MX-80				**$ CALL**
PAPER TIGER				
IDS 445	Graphics & 2K buffer			**$ 699**
IDS 460	Graphics & 2k buffer			**$1050**
IDS 560	Graphics			**$1599**
ANADEX	DP-8000	**$849**	DP-9500/01	**$1345**
OKIDATA				
Microline 80	Friction & pin feed			**$ 499**
Microline 80	Friction, and pin & tractor feed			**$ 599**
Microline 82	Friction & pin feed feed			**$ 719**
Microline 83	120 cps, uses up to 15" paper			**$ 995**
CENTRONICS	730 **$ 595**	737 **$ 780**	779	**$ 969**
EATON	LRC 7000 +			**$ 269**
TI-810				
TRS-80* software, compressed print & vert. form control				**$1865**

16K RAM KITS

2 for $56 **$30**
200 ns for TRS-80*, Apple II, (specify): **Jumpers** **$2.50**

S-100 CALIFORNIA COMPUTER SYSTEMS





MAINFRAME	Model 2200A	**$349**
Z80 CPU	Model 2810	**$269**
MOTHER BOARD	Model 2501	**$ CALL**
16K STATIC RAM, 200ns	Model 2016BC	**$309**
32K STATIC RAM, 200ns	Model 2032C	**$619**
64K DYNAMIC RAM	Model 2065A	**$599**
FLOPPY DISC CONTROLLER	Model 2422A	**$359**
EXTENDER BOARD	Model 2520	**$ CALL**
2P + 2S I/O	Model 2718	**$ CALL**

ACCESSORIES

Z-80 SOFTCARD	**$299.00**
SCOTCH HEAD CLEANING DISKETTE: Cleans drive Read/Write head in 30 seconds; specify 5¼" or 8".	**$ 25.00**
FLOPPY SAVER: Protection for center holes of 5¼" floppy disks. Installation tools and rings for 25 diskettes.	**$ 11.95**
Re-orders of rings only	**$ 6.95**
VIDEX BOARD 80 Column, U/L case conversion card	**$279.00**
CRT FILM: Helps eliminate external glare, 9"	**$ 29.00**
RF MODULATOR: Adapts video to TV	**$ 29.00**
TRS-80 & OTHER MYSTERIES	**$ 18.95**
NEC SPINWRITER THIMBLE **$11.95** **RIBBON**	**$ 6.00**
CCS CARDS: Parallel or serial printer interface cards	**$115.00**
RS232: For Radio Shack Interface.	**$ 89.00**
DISK-DRIVE EXTENDER CABLES: Fits all mini-disk drives.	**$ 16.95**
SIX (6) PRONG ISOLATOR: ISO-2	**$ 54.00**
AC FILTER/6 PRONG POWER STRIP	**$ 39.00**
DISK DRIVE CABLES: 2 drive **$29.00** 4 drive	**$ 35.00**

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require two to three weeks to clear. All prices are mail order only and are subject to change without notice. Call for shipping charges.

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Technical Information call 617/242-3361
Massachusetts Residents add 5% Sales Tax
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Free Literature

Business software is detailed in brochure. Written for Ohio Scientific computers, the package is compatible with floppy or hard disk; for general bookkeeping procedures. Data Access Management Service, 3320 Rivers Ave., Charleston, SC 29405.

CIRCLE INQUIRY NO. 201

Source software is included in catalog from Computer Pathways. Many business applications (accounts payable and receivable, cash disbursements, payroll, credit union, general ledger), program support (CP/M support module, Cindex—C Basic, Mindex—Microsoft Basic) and maintenance utility programs are listed. Ad Paths, Inc., 5024 Commercial St. S.E., Salem, OR 97302.

CIRCLE INQUIRY NO. 202

Accessories and interfaces are detailed in six-page short form catalog. Complete line of AC remote controls, data acquisition modules, printer adaptors and popular interfaces are included. Connecticut Microcomputer, 34 Del Mar Dr., Brookfield, CT 06804.

CIRCLE INQUIRY NO. 203

Tutorial article reprint details the need and the latest techniques for isolating data inquisition system input channels from damage and interference by large common mode voltages. Data Translation, 100 Locke Dr., Marlboro, MA 01752.

CIRCLE INQUIRY NO. 204

Data distribution equipment is described in eight-page catalog. Products are categorized as: modems, line drivers, ancillary products (modem eliminators, modem sharing units, async to sync converters) and interface converters. Avanti Communications Corp., Aquidneck Industrial Park, Newport, RI 02840.

CIRCLE INQUIRY NO. 205

Automatic continuity tester is described in four-page brochure. The "room-to-grow" system provides for upward expansion from 128 to 32,768 points on the same system. Designated CBT-128. Sensitek, Box 516, 139 Gaither Dr., Moorsetown, NJ 08054.

CIRCLE INQUIRY NO. 206

Newsletter subscriptions to 'Testing Techniques', a quarterly publication, are available. The newsletter is devoted to the technology of software quality assurance, addressing methods that serve to enhance the effectiveness of computer software. Software Research Assoc., Box 2432, San Francisco, CA 94126.

CIRCLE INQUIRY NO. 207

Management tips are offered in brochure 'Management's Guide to Computers and Office Systems'. The 28-page guide describes six subscription services, 10 reports, four training seminars, market research and consulting services. MIC, 140 Barclay Center, Cherry Hill, NJ 08034.

CIRCLE INQUIRY NO. 208

Terminals and Printers!

TELEVIDEO TVI-912C

Upper and lower case, 15 baud rates: 75 to 19,000 baud, dual intensity, 24 x 80 character display, 12 x 10 resolution. Numeric pad. Programmable reversible video, auxiliary port, self-test mode, protect mode, block mode, tabbing, addressable cursor. Microprocessor controlled, programmable underline, line and character insert/delete. "C" version features typewriter-style keyboard. List $950

CALL FOR PRICE

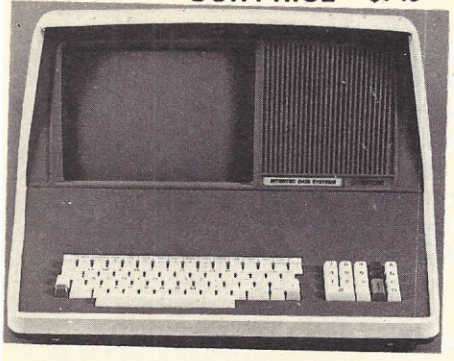
920C (with 11 function keys, 6 edit keys and 2 transmission mode keys, List $1030

CALL FOR PRICE

Intertec EMULATOR

Software compatible with a Soroc IQ-120, Hazeltine 1500, ADM-3A or DEC VT-52. Features block mode transmission and printer port; 12" anti-glare screen; 18-key numeric keypad; full cursor control. List $895

OUR PRICE $749



NEW INTERTUBE III

List $995 **ONLY $749**

12" display, 24 x 80 format, 18-key numeric keypad, 128 upper/lower case ASCII characters. Reverse video, blinking, complete cursor addressing and control. Special user-defined control function keys, protected and unprotected fields. Line insert/delete and character insert/delete editing, eleven special line drawing symbols.

SOROC

IQ-120
List $995
SPECIAL $729

IQ-140 List $1495
SPECIAL $1149

HAZELTINE

1500

ONLY $879

1410 w/numeric keypad, List $900 . . . . . **$749**
1420 w/lower case and numeric pad **849**
1510, List $1395 . . . . . **1089**
1520, List $1650 . . . . . **1389**

NEC SPINWRITER™

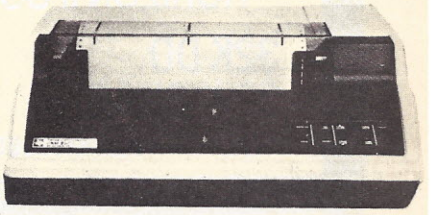
Terminal/Keyboard as well as RO Printer Only models available.

CALL FOR PRICES!

CENTRONICS PRINTERS

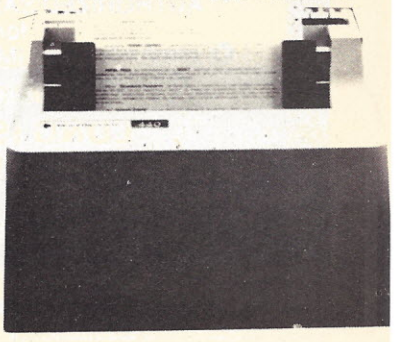
NEW 730, parallel, friction, tractor . . . **$649**
NEW 737 parallel, friction, tractor **$829**
779-2 w/tractor (same as TRS-80 Line Printer I), List $1350 **New Low Price—CALL**
702 120 cps, bi-direct., tractor, VFU . . . . **CALL**
703 185 cps, bi-direct., tractor, VFU **$1695**
704 RS232 serial version of 703, $2350 . . **$1595**

TI-810



TI-810 Basic Unit, $1895 . **ONLY $1695**
TI-810 w/full ASCII (Lower case), vertical forms control, and compressed print . **$1895**
TI-745 Complete printing terminal with acoustic coupler, List $1695 . . . . **$1399**

PAPER TIGER®



IDS-445 Paper Tiger, List $995 . . **$695**
w/graphics option, incl. buffer, $1194 . . **$789**
TRS-80 cable **45**
NEW IDS PAPERTIGER 460 List $1295 . **$1149**
NEW IDS PAPERTIGER 460G List $1394 **$1199**

NEW IDS 460
QUALITY PRINTING AT MATRIX SPEED—LOGIC SEEKING PROPORTIONAL SPACING
w/auto text justification

ANADEX
DP9500/DP9501 PRINTERS

DP-9500, List $1650 . . . . . **$1399**
DP-9501, List $1650 . . . . . **$1399**

OKIDATA Microline 80 **ONLY $649**
Tractor Feed Option **$99**
Serial interface **$89**
AXIOM IMP I **$699**
COMPRINT 912 w/parallel interf. **$559**
912 w/serial interface, List $699 . . . . . **$589**
MICROTEK, List $750 . . . . . **$675**
ANADEX 80-Col. Dot Matrix. **$849**

Above prices reflect a 2% cash discount (order prepaid prior to shipment). Add 2% to prices for credit card orders, C.O.D.'s, etc. Prices are f.o.b. shipping point. Prices are subject to change and offers subject to withdrawal without notice. **WRITE FOR FREE CATALOG.**

CIRCLE INQUIRY NO. 113

MiniMicroMart, Inc.

1618 James Street, Syracuse NY 13203 (315) 422-4467 TWX 710-541-0431

VISA
master charge

Interact personal computer is described in eight-page catalog. Additional software, accessories, memory expansion and parts and service are available, although Interact is no longer in business. Micro Video, Box 7357, 204 E. Washington St., Ann Arbor, MI 48107.

CIRCLE INQUIRY NO. 209

Tuning diode selector guide lists all Motorola tuning diodes for frequency control, plus hot-carrier diodes for mixing and detection and PIN diodes for switching. Design curves, package information and reliability data are included. Motorola Semiconductor Group, Box 20912, Phoenix, AZ 85036.

CIRCLE INQUIRY NO. 210

Supplies and accessories catalog includes magnetic media such as disc packs, cartridges, diskettes and tape, printer and terminal supplies. Catalog #012-710-2. Communication Services, Data General Corp., 4400 Computer Dr., Westboro, MA 01580.

CIRCLE INQUIRY NO. 211

Business systems are listed in brochure. Also included are corporate philosophy and history. Mercator Business Systems, 1294 Lawrence Station Rd., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 212

Software catalog for the TRS-80 provides detailed descriptions and technical information on available products. Racet Computes, 702 Palmdale, Orange, CA 92665.

CIRCLE INQUIRY NO. 213

Electronic technical furniture is detailed in four-color catalog. Actual information processing work center installations are illustrated, as well as detailed plan views of the basic unit and add-on units. Structural Concepts Corp., 17237 Van Wagoner Rd., Spring Lake, MI 49456.

CIRCLE INQUIRY NO. 214

Black Box catalog of data communication devices features 107 products in 167 models. Included are protocol converters, interface converters, EIA and coaxial switches, modem eliminators, short haul modems, current loop devices, line and modem sharing units, answer back units, line use measuring devices, cables, connectors and test sets. Expandor, Inc., 400 Sainte Claire Plaza, Pittsburgh, PA 15241, (412) 746-2910.

CIRCLE INQUIRY NO. 215

Teleprocessing monitor selection procedures are detailed in 68-page manual. Among subjects covered are: the selection process, the charter, collecting users' names, evaluation list for ideal monitor, communications, queue management, program management, implementation, performance, cost and vendor. SDA, 475 Park Ave. S., 26th Floor, New York, NY 10016.

CIRCLE INQUIRY NO. 216

Power supplies are specified in two-page data sheet. Product descriptions, applications information and electrical/mechanical specifications are included. Power Products Div., Computer Products, Pompano Beach, FL 33060, (305) 974-2442.

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Books for Tomorrow

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By Bob Albrecht, Don Inman & Ramon Zamora
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By Mitchell Waite & Michael Pardee
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Computer Graphics Primer
By Mitchell Waite
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Describes one of the most exciting developments in the new home computer products, computer graphics. Computer graphics is the ability to create complex drawings, plan, maps, and schematics on the screen of a television set.

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By Rodnay Zaks
Order No. 17,105 321 pages $13.95

This book is intended to teach you how to use CP/M and its resources. No prior computer knowledge is needed. It is assumed that you have access to a computer system equipped with CP/M. Depending upon the application programs that you execute on a computer, will depend if you use all or part of the resources provided by CP/M.

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Continued from page 72

that give me a Z-80 based system operating under CP/M with two 8-in. drives.

I use modified off-the-shelf software. And regardless of which system I'm using, I have communications capability, either through direct RS-232 hook-up or telephone modem.

Software for the CP/M system makes it a real work horse. And the best all-around software package I have found for this type of work comes in two parts. These are a text editor/text processor package from Technical Systems Consultants, Lafayette, IN, and a printer driver package for the Diablo 1620 daisywheel printer from Waltek Engineering, Ft. Worth, TX.

The TSC package costs less than a hundred dollars and performs better than some systems costing four or five times that much. It can do about 90% of the jobs outlined in this article.

The editor is outstanding. The processor has most of the extended macro capabilities described here, making it almost ideal. I have been using it on two separate systems for over three years and feel that it was designed by people who had serious writing in mind.

Using this package is a two-step process. That is, it is an editor and a processor. At this point, I have not been able to make it handle decimal numbering in paragraphs and pages, but sectionalizing them has worked out fine. For example, pages for section 3 are numbered 3-1 through 3-150, etc. And, of course, the system permits printing specified blocks of a file without having to print the entire file. The system is quite versatile and almost universal.

The TSC unit comes in several versions. One runs under CP/M (8080/Z-80 systems); another runs under FLEX (6800 systems). Another runs under Smoke Signals Broadcasting (6800 also). And there is even a version supported by Percom's Index operating system (also 6800). I have used this version in portable applications and still do, from time to time.

No matter which version you buy, you get the source code, which makes it easy to apply your own custom patches. For hard copy output, it depends on the operating system's printer driver. So it's up to you to make sure that you have a driver for your printer. And that isn't always easy.

The printer driver is a hard-to-find item, but no serious writing system is complete without it. I have not seen another stand-alone printer driver that implements all of the bells and whistles on the Diablo 1620 daisywheel printer. But the Waltek driver does just that. At $29.95, plus $2.00 for shipping, it is a great buy. With this driver, you can do underscore or boldface. You can do superscripts: $Y = X^3$ or subscripts: $BW = Q*X_c$.

In addition to these features, the driver comes with complete source code on 8-in. single density, soft sectored CP/M compatible floppy disk. It is ROM-able, and relocatable. It is virtually independent of operating system and automatically loads itself into high memory when brought up on the system. And to make it complete, it has complete handshaking routines built in, making it possible to use the Diablo 1620 at 1200 baud. A special version is being developed for the TRS-80 and custom versions are available on request.

This system has evolved over several years of hard use. It has been extremely reliable with no lost time on any assignment due to equipment or software failure. □

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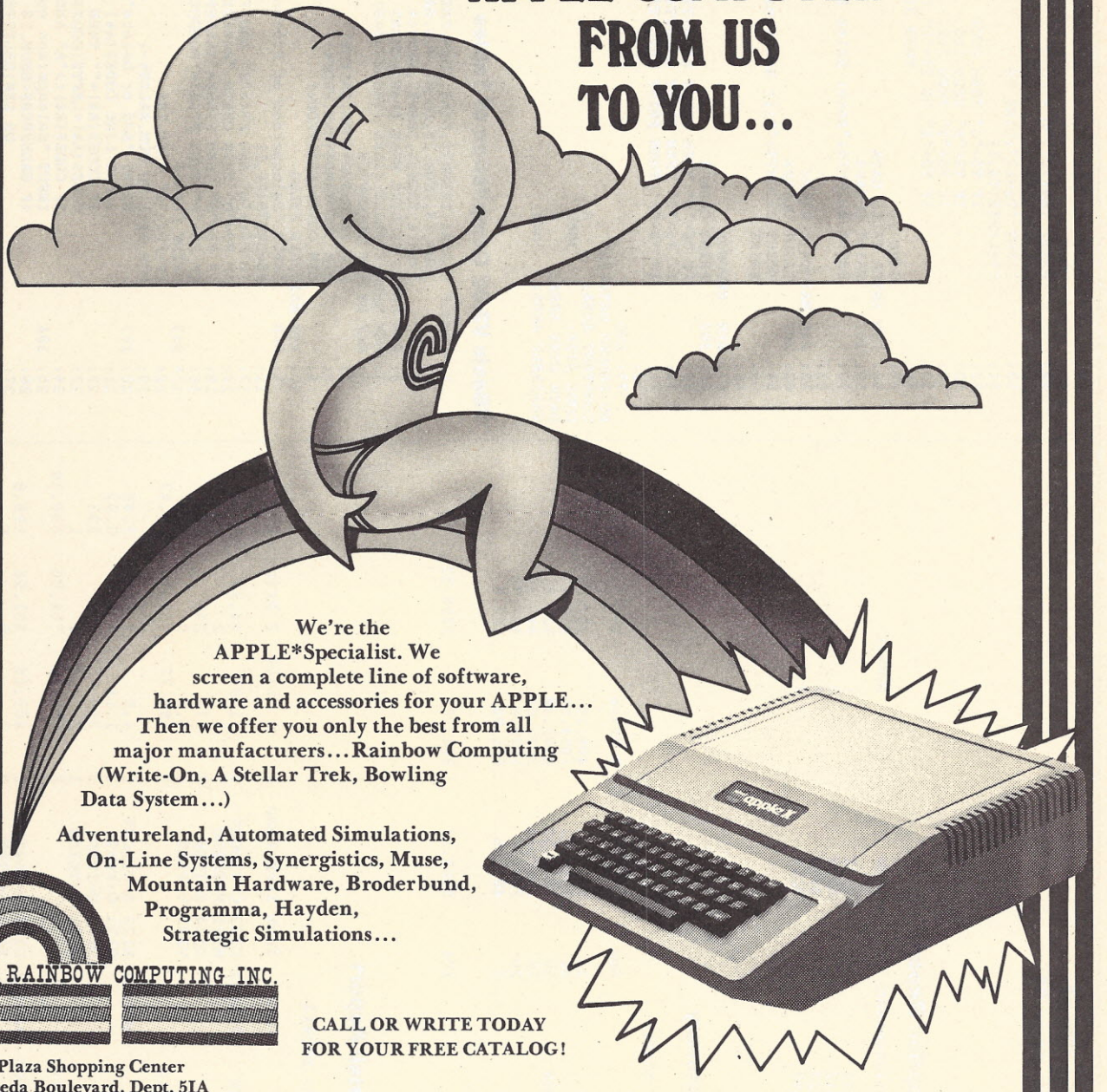

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Who's Selling What

Continued from page 68

Sales Data Exception Report

```
Date            Salesperson         Item              Number

800909          A99                 A123              1
800909          A12                 A999              2
800909          B12                 Z999              3
800909          Z99                 B121              3

Errors     4
```

Salesperson Summary

```
From: 800909  To: 800911

Slnm Name                    Num     W Price     R Price      R-W

A12  ARTHUR ALLEN            21      379.13      486.16       107.03
B12  BOB BENSEN              22      1020.01     1854.62      834.61
C12  CINDY CUMMINGS          20      1639.67     2565.48      925.81
D12  DON DELANY              19      1198.33     2082.68      884.35
E12  ELLEN EMERY             20      764.87      1272.6       507.73
F12  FRANK FARMER            2       403.16      601.96       198.8


Grand Totals                 104     5405.17     8863.5       3458.33
```

Salesperson Detail Report

```
From: 800911  To: 800911

Slnm Name            Date    Inum Item Name   #    W Price   R Price   R-W

A12  ARTHUR ALLEN    800911  C122 C-WIDGET    3    11.07     14.34     3.27
                             M121 M-THING     1    1         2         1
                             S124 S-ITEM      2    178       230       52
                             V123 V-PART      2    4.7       9         4.3
Salesperson Totals                            8    194.77    255.34    60.57

B12  BOB BENSEN      800911  B122 B-WIDGET    2    4.5       7.96      3.46
                             O123 O-PART      2    1.18      2.1       0.92
                             Q124 Q-ITEM      3    369       702       333
                             W121 W-THING     1    1         2         1
Salesperson Totals                            8    375.68    714.06    338.38

C12  CINDY CUMMINGS  800911  D123 D-PART      2    403.16    601.96    198.8
                             E124 E-ITEM      3    3         9         6
                             H122 H-WIDGET    1    5.89      8.79      2.9
                             R121 R-THING     1    11.15     14.72     3.57
Salesperson Totals                            7    423.2     634.47    211.27
```

```
   46:        PRINT TAB(10);"S - SALESPERSON SUMMARY REPORT"
   47:        PRINT
   48:        PRINT TAB(10);"Q - QUIT"
   49:        PRINT:PRINT
   50:        INPUT "Task?";LINE T$
   51:        T$=LEFT$(T$,1)
   52:              IF T$="Q" THEN STOP
   53:              IF T$="M" THEN 100
   54:              IF T$="T" THEN 200
   55:              IF T$="E" OR T$="D" OR T$="S"\
   56:                              THEN 300
   57:        GOTO 10
   58: REM ENTER SALES DATA
   59: 100    PRINT CLEAR$
   60:        PRINT BRIGHT$;"Enter Sales Data";DIM$
   61:                                          CHAIN "UPMAST"
   62: REM MAINTAIN FILES
   63: 200    PRINT CLEAR$
   64:        PRINT BRIGHT$;"File Maintenance";DIM$
   65:        PRINT
   66:                                          CHAIN "TABLES"
   67: REM  REPORTS
   68: 300    PRINT CLEAR$
   69:        IF T$="E" THEN PRINT BRIGHT$;"Error Report";DIM$
   70:        IF T$="D" THEN PRINT BRIGHT$;"Salesperson Detail Report";DIM$
   71:        IF T$="S" THEN PRINT BRIGHT$;"Salesperson Summary Report";DIM$
   72:                                          CHAIN "REPORTS"
   73: END
NO ERRORS DETECTED
CONSTANT AREA:      8
CODE SIZE:       3000
DATA STMT AREA:     0
VARIABLE AREA:    500
```

CBasic V2.02 Compilation of Tables

```
    1: COMMON CLEAR$,BRIGHT$,DIM$,FORM.FEED$,YEAR.1$,YEAR.2$,SNUM.1$,SNUM.2$,\
    2:        INUM.1$,INUM.2$,TRAN%,NUM.SALES%,NUM.PROD%,HIGH$,T$,\
    3:        ERSW1%,ERSW2%,ERSW3%,ERSW4%
    4: REM WHO'S SELLING WHAT (MANAGEMENT REPORTS)
    5: REM UPDATE TABLE FILES (TABLES.BAS)
    6: REM BY RAY VUKCEVICH
    7:        DIM SALESPER$(NUM.SALES%)
    8:        DIM ITEMNAME$(NUM.PROD%)
    9:        DIM CODE$(NUM.PROD%)
   10: REM MAINTAIN FILES
   11: 200    INPUT "Salesperson or Product (or Quit)?";LINE F$
   12:        F$=LEFT$(F$,1)
   13:        IF F$<>"Q" AND F$<>"S" AND F$<>"P" THEN 200
   14:        IF F$="Q" THEN CHAIN "MANAGE"
   15:        IF F$="S" THEN FILE$="SALESPER.PAR"
   16:        IF F$="P" THEN FILE$="PRODUCT.PAR"
   17* 202    PRINT CLEAR$
   18:        IF F$<>"S" THEN 205
   19:        FOR A%=1 TO NUM.SALES%-1
   20: 203          PRINT "Add or Delete";A%;
   21:              INPUT LINE CODE$(A%)
   22:              IF CODE$(A%)="" THEN 209
   23:              CODE$(A%)=LEFT$(CODE$(A%),1)
   24:              IF CODE$(A%)<>"A" AND CODE$(A%)<>"D" THEN 203
   25: 204          INPUT "Salesperson number?";LINE SALESPER$
   26:              IF SALESPER$<SNUM.1$ OR SALESPER$>SNUM.2$\
   27:                    OR LEN(SALESPER$)<>3 THEN 204
   28:              INPUT "Salesperson name?";LINE SALESNAME$
   29:              IF SALESNAME$="" THEN 204
   30:              SALESNAME$=LEFT$(SALESNAME$+"                ",15)
   31:              PRINT
```

```
D12  DON DELANY       800911 G121 G-THING    1     2.57      4.98      2.41
                             J122 J-WIDGET   2     0.5       1.96      1.46
                             T123 T-PART     3     1.08      7.74      6.66
                             X124 X-ITEM     2     186       211.32    25.32
Salesperson Totals                           8     190.15    226       35.85

E12  ELLEN EMERY      800911 I122 I-WIDGET   2     2.94      5.96      3.02
                             L121 L-THING    1     5         7         2
                             T124 T-ITEM     1     55.55     66.66     11.11
                             Y123 Y-PART     3     370.35    774.75    404.4
Salesperson Totals                           7     433.84    854.37    420.53


Grand Totals                                 38    1617.64   2684.24   1066.6
```

CBasic V2.02 Compilation of Manage

```
    1: %CHAIN 8,3000,0,500
    2: COMMON CLEAR$,BRIGHT$,DIM$,FORM.FEED$,YEAR.1$,YEAR.2$,SNUM.1$,SNUM.2$,\
    3:        INUM.1$,INUM.2$,TRAN%,NUM.SALES%,NUM.PROD%,HIGH$,T$,\
    4:        ERSW1%,ERSW2%,ERSW3%,ERSW4%
    5: REM WHO'S SELLING WHAT (MANAGEMENT REPORTS)
    6: REM MENU PROGRAM (MANAGE.BAS)
    7: REM BY RAY VUKCEVICH
    8:        CLEAR$=CHR$(126)+CHR$(28)
    9:        BRIGHT$=CHR$(126)+CHR$(31)
   10:        DIM$=CHR$(126)+CHR$(25)
   11:        FORM.FEED$=CHR$(12)
   12: REM PARAMETERS
   13:        YEAR.1$="79"
   14:        YEAR.2$="80"
   15:        SNUM.1$="A01"
   16:        SNUM.2$="Z99"
   17:        INUM.1$="A001"
   18:        INUM.2$="Z999"
   19:        TRAN%=501
   20:        NUM.SALES%=10
   21:        NUM.PROD%=100
   22:        HIGH$="ZZZZZZZZZZZZZZZZZZZZZZZZZZ"
   23: REM GET MENU SELECTION
   24: 10     PRINT CLEAR$
   25:        PRINT TAB(10);"Management Reports"
   26:        PRINT TAB(10);"---------- -------"
   27:        PRINT
   28: REM ERROR MESSAGE AREA
   29:        IF ERSW1% THEN ERSW1%=0:PRINT TAB(10);BRIGHT$;:\
   30:              PRINT "No Salesperson File";DIM$:PRINT
   31:        IF ERSW2% THEN ERSW2%=0:PRINT TAB(10);BRIGHT$;:\
   32:              PRINT "No Product File";DIM$:PRINT
   33:        IF ERSW3% THEN ERSW3%=0:PRINT TAB(10);BRIGHT$;:\
   34:              PRINT "No Error File";DIM$:PRINT
   35:        IF ERSW4% THEN ERSW4%=0:PRINT TAB(10);BRIGHT$;:\
   36:              PRINT "No Master File";DIM$:PRINT
   37:        PRINT TAB(10);"Maintenance"
   38:        PRINT TAB(10);"-----------"
   39:        PRINT TAB(10);"M - UPDATE MASTER FILE"
   40:        PRINT TAB(10);"T - UPDATE TABLE FILES"
   41:        PRINT
   42:        PRINT TAB(10);"Reports"
   43:        PRINT TAB(10);"-------"
   44:        PRINT TAB(10);"E - ERROR REPORT"
   45:        PRINT TAB(10);"D - SALESPERSON DETAIL REPORT"
   32:              SALESPER$(A%)=SALESPER$+SALESNAME$
   33:        NEXT A%
   34: 205    IF F$<>"P" THEN 207
   35:        FOR A%=1 TO NUM.PROD%-1
   36: 206          PRINT "Add or Delete";A%;
   37:              INPUT LINE CODE$(A%)
   38:              IF CODE$(A%)="" THEN 209
   39:              CODE$(A%)=LEFT$(CODE$(A%),1)
   40:              IF CODE$(A%)<>"A" AND CODE$(A%)<>"D" THEN 206
   41: 207          INPUT "Item number?";LINE ITEMNUM$
   42:              IF ITEMNUM$<INUM.1$ OR ITEMNUM$>INUM.2$\
   43:                    OR LEN(ITEMNUM$)<>4 THEN 207
   44:              INPUT "Item name?";LINE ITEMNAME$
   45:              ITEMNAME$=LEFT$(ITEMNAME$+"          ",10)
   46:              INPUT "Wholesale Price?";LINE W.PRICE$
   47:              IF LEN(W.PRICE$)>6 THEN 207
   48:              W.PRICE$=LEFT$(W.PRICE$+"      ",6)
   49:              INPUT "Retail Price?";LINE R.PRICE$
   50:              IF LEN(R.PRICE$)>6 THEN 207
   51:              R.PRICE$=LEFT$(R.PRICE$+"      ",6)
   52:              ITEMNAME$(A%)=ITEMNUM$+ITEMNAME$+W.PRICE$+R.PRICE$
   53:              PRINT
   54:        NEXT A%
   55: 209    A%=A%-1
   56:              GOSUB 1400
   57:        PRINT CLEAR$
   58:        PRINT BRIGHT$;"Writing...";DIM$
   59:        END.FILE%=0
   60:        FILE.NUM%=1
   61:        GOSUB 1000
   62:        FILE$="HOLD"
   63:        FILE.NUM%=2
   64:        GOSUB 1000
   65:        HAVE.MAST%=0
   66:        HAVE.TRAN%=0
   67:        B%=0
   68: 210    IF HAVE.MAST% THEN 212
   69:              FILE.NUM%=1
   70:              GOSUB 1200
   71:              IF END.FILE% THEN MAST$=HIGH$
   72:              HAVE.MAST%=1
   73: 212    IF HAVE.TRAN% THEN 214
   74:              B%=B%+1
   75:              HAVE.TRAN%=1
   76:              IF B%>A% THEN TRAN$=HIGH$:GOTO 214
   77:              IF F$="S" THEN TRAN$=SALESPER$(B%)
   78:              IF F$="P" THEN TRAN$=ITEMNAME$(B%)
   79: 214    IF MAST$=HIGH$ AND TRAN$=HIGH$ THEN 270
   80:        IF MAST$>TRAN$ THEN GOSUB 220
   81:        IF MAST$<TRAN$ THEN GOSUB 230
   82:        IF MAST$=TRAN$ THEN GOSUB 240
   83:              FILE.NUM%=2
   84:              IF WRITE.MAST% THEN GOSUB 250
   85:              IF WRITE.TRAN% THEN GOSUB 260
   86:                    GOTO 210
   87: 220    HAVE.TRAN%=0
   88:        IF CODE$(B%)="D" THEN\
   89:              PRINT BRIGHT$;"Record not found";DIM$:\
   90:              PRINT TRAN.1$,TRAN.2$:\
   91:              INPUT "Hit RETURN";LINE RT$:RETURN
   92:        WRITE.TRAN%=1
   93:                                              RETURN
   94: 230    HAVE.MAST%=0
   95:        WRITE.MAST%=1
   96:                                              RETURN
   97: 240    HAVE.TRAN%=0
   98:        HAVE.MAST%=0
   99:        IF CODE$(B%)="D" THEN RETURN
  100:        WRITE.MAST%=1
```

```
  101:         WRITE.TRAN%=1
  102:                                                 RETURN
  103: 250     WRITE.MAST%=0
  104:         REC$=MAST$
  105:                 GOSUB 1300
  106:                                                 RETURN
  107: 260     REC$=TRAN$
  108:         WRITE.TRAN%=0
  109:                 GOSUB 1300
  110:                                                 RETURN
  111: 270     DELETE 1
  112:         CLOSE 2
  113:         IF F$="S" THEN R%=RENAME("SALESPER.PAR","HOLD")
  114:         IF F$="P" THEN R%=RENAME("PRODUCT.PAR","HOLD")
  115:                 CHAIN "MANAGE"
  116: REM OPEN FILE
  117: 1000    OLD.FILE%=0
  118:         IF END # FILE.NUM% THEN 1010
  119:         OPEN FILE$ AS FILE.NUM%
  120:                 OLD.FILE%=1
  121:                 GOTO 1020
  122: 1010    IF READ% THEN 1020
  123:         CREATE FILE$ AS FILE.NUM%
  124: 1020                                            RETURN
  125: REM READ SALES OR ITEM FILE
  126: 1200    IF END # FILE.NUM% THEN 1210
  127:         READ # FILE.NUM%;MAST$
  128:                                                 RETURN
  129: 1210    END.FILE%=1
  130:                                                 RETURN
  131: REM WRITE SALES OR ITEM FILE
  132: 1300    PRINT # FILE.NUM%;REC$
  133:                                                 RETURN
  134: REM SORT TRANSACTION
  135: 1400    PRINT CLEAR$
  136:         PRINT BRIGHT$;"Sorting...";DIM$
  137:         SORT%=A%
  138: 1410    SORT%=SORT%/2
  139:         IF SORT%=0 THEN RETURN
  140:         J%=1:K%=A%-SORT%
  141: 1420    I%=J%
  142: 1430    L%=I%+SORT%
  143:         IF F$<>"S" THEN 1432
  144:         IF SALESPER$(I%)<SALESPER$(L%) THEN 1440
  145:         HN$=CODE$(I%):CODE$(I%)=CODE$(L%):CODE$(L%)=HN$
  146:         HN$=SALESPER$(I%):SALESPER$(I%)=SALESPER$(L%):SALESPER$(L%)=HN$
  147: 1432    IF F$<>"P" THEN 1434
  148:         IF ITEMNAME$(I%)<ITEMNAME$(L%) THEN 1440
  149:         HN$=CODE$(I%):CODE$(I%)=CODE$(L%):CODE$(L%)=HN$
  150:         HN$=ITEMNAME$(I%):ITEMNAME$(I%)=ITEMNAME$(L%):ITEMNAME$(L%)=HN$
  151: 1434    I%=I%-SORT%
  152:         IF I%<1 THEN 1440
  153:         GOTO 1430
  154: 1440    J%=J%+1
  155:         IF J%>K% THEN 1410
  156:         GOTO 1420
  157: END
NO ERRORS DETECTED
CONSTANT AREA:       8
CODE SIZE:        1748
DATA STMT AREA:      0
VARIABLE AREA:     424
```

CBasic V2.02 Compilation of Upmast

```
    1: COMMON CLEAR$,BRIGHT$,DIM$,FORM.FEED$,YEAR.1$,YEAR.2$,SNUM.1$,SNUM.2$,\
    2:         INUM.1$,INUM.2$,TRAN%,NUM.SALES%,NUM.PROD%,HIGH$,T$,\
   71:                 IF KEY$<SALESPER$(B%) THEN 116
   72:             NEXT B%
   73:             GOTO 116
   74: 112         FOR C%=1 TO NUM.PROD%
   75:                 KEY$=MID$(KEY$(A%),10,4)
   76:                 IF KEY$=ITEMNUM$(C%) THEN 114
   77:                 IF KEY$<ITEMNUM$(C%) THEN 116
   78:             NEXT C%
   79:             GOTO 116
   80: 114         KEY.2$(D%)=KEY$(A%)
   81:             D%=D%+1
   82: 115     NEXT A%
   83:         IF ERR.SW% THEN CLOSE 1
   84:             GOTO 120
   85: REM WRITE ERROR
   86: 116     IF ERR.SW%=0 THEN GOSUB 118
   87:         PRINT #1;KEY$(A%)
   88:         X%=X%-1
   89:         GOTO 115
   90: 118     FILE$="ERROR.FIL"
   91:         GOSUB 1000
   92:         ERR.SW%=1
   93:                                             RETURN
   94: 120     GOSUB 1400
   95:         PRINT CLEAR$
   96:         PRINT BRIGHT$;"Writing...";DIM$
   97:         END.FILE%=0
   98:         FILE$="MASTER.FIL"
   99:         FILE.NUM%=1
  100:         GOSUB 1000
  101:         FILE$="HOLD"
  102:         FILE.NUM%=2
  103:         GOSUB 1000
  104:         HAVE.MAST%=0
  105:         HAVE.TRAN%=0
  106:         B%=0
  107: 122     IF HAVE.MAST% THEN 124
  108:             FILE.NUM%=1
  109:             GOSUB 1500
  110:             IF END.FILE% THEN KEY$=HIGH$
  111:             HAVE.MAST%=1
  112: 124     IF HAVE.TRAN% THEN 126
  113:             B%=B%+1
  114:             IF B%>X% THEN KEY.2$(B%)=HIGH$
  115:             HAVE.TRAN%=1
  116: 126     IF KEY$=HIGH$ AND KEY.2$(B%)=HIGH$ THEN 180
  117:         IF KEY$>KEY.2$(B%) THEN GOSUB 130
  118:         IF KEY$<KEY.2$(B%) THEN GOSUB 140
  119:         IF KEY$=KEY.2$(B%) THEN GOSUB 150
  120:             FILE.NUM%=2
  121:             IF WRITE.MAST% THEN GOSUB 160
  122:             IF WRITE.TRAN% THEN GOSUB 170
  123:                 GOTO 122
  124: 130     HAVE.TRAN%=0
  125:         IF MODE$="Y" THEN PRINT BRIGHT$;"Record not found";DIM$:\
  126:             PRINT KEY$(B%):\
  127:                 INPUT "Hit RETURN";LINE RT$:RETURN
  128:         WRITE.TRAN%=1
  129:                                             RETURN
  130: 140     HAVE.MAST%=0
  131:         WRITE.MAST%=1
  132:                                             RETURN
  133: 150     HAVE.TRAN%=0
  134:         HAVE.MAST%=0
  135:         IF MODE$="Y" THEN RETURN
  136:         WRITE.TRAN%=1
  137:         WRITE.MAST%=1
  138:                                             RETURN
  139: 160     WRITE.MAST%=0
```

```
  3:        ERSW1%,ERSW2%,ERSW3%,ERSW4%
  4: REM WHO'S SELLING WHAT (MANAGEMENT REPORTS)
  5: REM UDATE MASTER FILE (UPMAST.BAS)
  6: REM BY RAY VUKCEVICH
  7:        DIM KEY$(TRAN%),KEY.2$(TRAN%)
  8:        DIM SALESPER$(NUM.SALES%)
  9:        DIM ITEMNUM$(NUM.PROD%)
 10: REM ENTER SALES DATA
 11* 100    PRINT CLEAR$
 12:        PRINT
 13:        INPUT "Delete Mode?";LINE MODE$
 14:        MODE$=LEFT$(MODE$,1)
 15:        IF MODE$="Y" THEN PRINT:PRINT BRIGHT$;"Delete only";DIM$:PRINT
 16:                X%=1
 17: 103    INPUT "Date (YYMMDD)?";LINE DATE$
 18:        IF DATE$="" THEN 110
 19:        IF LEN(DATE$)<>6 THEN 103
 20:        IF LEFT$(DATE$,2)< YEAR.1$ OR LEFT$(DATE$,2)> YEAR.2$\
 21:                        THEN 103
 22:        IF VAL(MID$(DATE$,3,2))<1 OR VAL(MID$(DATE$,3,2))>12\
 23:                        THEN 103
 24:        IF VAL(RIGHT$(DATE$,2))<1 OR VAL(RIGHT$(DATE$,2))>31\
 25:                        THEN 103
 26: 105    PRINT TAB(5);"Salesperson number";
 27:        INPUT LINE SLSNUM$
 28:        IF SLSNUM$="" THEN 103
 29:        IF LEN(SLSNUM$)<>3 THEN 105
 30:        IF SLSNUM$<SNUM.1$ OR SLSNUM$>SNUM.2$ THEN 105
 31: 107    PRINT TAB(10);"Item number";
 32:        INPUT LINE ITEM$
 33:        IF ITEM$="" THEN 105
 34:        IF LEN(ITEM$)<>4 THEN 107
 35:        IF ITEM$<INUM.1$ OR ITEM$>INUM.2$ THEN 107
 36: 109    PRINT TAB(15);"Number Sold";
 37:        INPUT LINE NUM$
 38:        IF NUM$="" THEN 107
 39:        IF VAL(NUM$)<1 OR VAL(NUM$)>999 THEN 109
 40:        NUM$=LEFT$(NUM$+"   ",3)
 41:                        KEY$(X%)=SLSNUM$+DATE$+ITEM$+NUM$
 42:                        X%=X%+1
 43:                        IF X%>TRAN%-1 THEN 110
 44:                        GOTO 107
 45: REM EDIT DATA
 46: 110    X%=X%-1
 47:        READ%=1
 48:        FILE.NUM%=1
 49:        PRINT CLEAR$
 50:        PRINT BRIGHT$;"Editing...";DIM$
 51:        FILE$="SALESPER.PAR"
 52:        GOSUB 1000
 53:        IF OLD.FILE%=0 THEN ERSW1%=1:GOTO 190
 54:        F$="S"
 55:        GOSUB 1100
 56:        CLOSE 1
 57:        FILE$="PRODUCT.PAR"
 58:        GOSUB 1000
 59:        IF OLD.FILE%=0 THEN ERSW2%=1:GOTO 190
 60:        F$="P"
 61:        GOSUB 1100
 62:        CLOSE 1
 63:        READ%=0
 64:        ERR.SW%=0
 65:        D%=1
 66:        Y%=X%
 67:        FOR A%=1 TO Y%
 68:              FOR B%=1 TO NUM.SALES%
 69:                        KEY$=LEFT$(KEY$(A%),3)
 70:                        IF KEY$=SALESPER$(B%) THEN 112
```

```
140:        REC$=KEY$
141:        GOSUB 1600
142:                                          RETURN
143: 170    WRITE.TRAN%=0
144:        REC$=KEY.2$(B%)
145:        GOSUB 1600
146:                                          RETURN
147: 180    IF SIZE("MASTER.FIL")=0 THEN DELETE 1:CLOSE 2:GOTO 185
148:        CLOSE 1
149:        CLOSE 2
150:        IF SIZE("MASTER.BAK")<>0 THEN OPEN "MASTER.BAK" AS 1:DELETE 1
151:        R%=RENAME("MASTER.BAK","MASTER.FIL")
152: 185    R%=RENAME("MASTER.FIL","HOLD")
153: 190    IF ERR.SW% THEN PRINT BRIGHT$;"Errors Written";DIM$:\
154:              INPUT "Hit RETURN";LINE RT$
155:        CHAIN "MANAGE"
156: REM OPEN FILE
157: 1000   OLD.FILE%=0
158:        IF END # FILE.NUM% THEN 1010
159:        OPEN FILE$ AS FILE.NUM%
160:              OLD.FILE%=1
161:              GOTO 1020
162: 1010   IF READ% THEN 1020
163:        CREATE FILE$ AS FILE.NUM%
164: 1020                                     RETURN
165: REM GET FILE INTO ARRAYS
166: 1100   END.FILE%=0
167:        IF F$="S" THEN N%=NUM.SALES% ELSE N%=NUM.PROD%
168:              FOR A%=1 TO N%
169:                    GOSUB 1200
170:                    IF END.FILE% THEN 1110
171:                    IF F$="S" THEN SALESPER$(A%)=LEFT$(REC$,3)
172:                    IF F$="P" THEN ITEMNUM$(A%)=LEFT$(REC$,4)
173:              NEXT A%
174: 1110                                     RETURN
175: REM READ SALES OR ITEM FILE
176: 1200   IF END # FILE.NUM% THEN 1210
177:              READ # FILE.NUM%;REC$
178:                                          RETURN
179: 1210   END.FILE%=1
180:                                          RETURN
181: REM SORT TRANSACTION
182: 1400   PRINT CLEAR$
183:        PRINT BRIGHT$;"Sorting...";DIM$
184:        SORT%=X%
185: 1410   SORT%=SORT%/2
186:        IF SORT%=0 THEN RETURN
187:        J%=1:K%=X%-SORT%
188: 1420   I%=J%
189: 1430   L%=I%+SORT%
190:        IF KEY.2$(I%)<KEY.2$(L%) THEN 1440
191:        HN$=KEY.2$(I%):KEY.2$(I%)=KEY.2$(L%):KEY.2$(L%)=HN$
192:        I%=I%-SORT%
193:        IF I%<1 THEN 1440
194:        GOTO 1430
195: 1440   J%=J%+1
196:        IF J%>K% THEN 1410
197:        GOTO 1420
198: REM READ MASTER FILE
199: 1500   IF END # FILE.NUM% THEN 1510
200:        READ # FILE.NUM%;KEY$
201:                                          RETURN
202: 1510   END.FILE%=1
203:                                          RETURN
204: REM WRITE MASTER FILE
205: 1600   PRINT # FILE.NUM%;REC$
206:                                          RETURN
207: END
NO ERRORS DETECTED
```

```
CONSTANT AREA:      8
CODE SIZE:       1942
DATA STMT AREA:     0
VARIABLE AREA:    448
```

CBasic V2.02 Compilation of Reports

```
  1: COMMON CLEAR$,BRIGHT$,DIM$,FORM.FEED$,YEAR.1$,YEAR.2$,SNUM.1$,SNUM.2$,\
  2:        INUM.1$,INUM.2$,TRAN%,NUM.SALES%,NUM.PROD%,HIGH$,T$,\
  3:        ERSW1%,ERSW2%,ERSW3%,ERSW4%
  4: REM WHO'S SELLING WHAT (MANAGEMENT REPORTS)
  5: REM REPORT PROGRAM (REPORTS.BAS)
  6: REM BY RAY VUKCEVICH
  7:        DIM SALESPER$(NUM.SALES%),SALESNAME$(NUM.SALES%)
  8:        DIM ITEMNUM$(NUM.PROD%),ITEMNAME$(NUM.PROD%)
  9:        DIM W.PRICE$(NUM.PROD%),R.PRICE$(NUM.PROD%)
 10:        IF T$="E" THEN 300
 11:              GOTO 400
 12: REM ERROR REPORT
 13: 300    PRINT CLEAR$
 14:        INPUT "Print?";LINE Q$
 15:              E%=0
 16:              READ%=1
 17:              END.FILE%=0
 18:              FILE$="ERROR.FIL"
 19:              FILE.NUM%=1
 20:              GOSUB 1000
 21:              IF OLD.FILE%=0 THEN ERSW3%=1:GOTO 330
 22:        IF LEFT$(Q$,1)="Y" THEN LPRINTER
 23:        PRINT TAB(5);"Sales Data Exception Report"
 24:        PRINT
 25:        PRINT TAB(5);"Date","Salesperson","Item","Number"
 26:        PRINT
 27: 310    GOSUB 1500
 28:        IF END.FILE% THEN 320
 29:        E%=E%+1
 30:        PRINT TAB(5);DATE$,SLSNUM$,ITEM$,NUM$
 31:        GOTO 310
 32: 320    PRINT
 33:        PRINT TAB(5);"Errors";TAB(15);E%
 34:        IF LEFT$(Q$,1)="Y" THEN PRINT FORM.FEED$:CONSOLE
 35:        PRINT:PRINT
 36:        INPUT "Delete Error File?";LINE Q$
 37:        IF LEFT$(Q$,1)<>"Y" THEN CLOSE FILE.NUM%:GOTO 330
 38:              DELETE FILE.NUM%
 39: 330                          CHAIN "MANAGE"
 40: REM SALESPERSON DETAIL REPORT
 41: 400    PRINT CLEAR$
 42:        INPUT "Starting Date (YYMMDD)?";S.DATE$
 43:        INPUT "Ending Date (YYMMDD)?";E.DATE$
 44:        INPUT "Print?";LINE Q$
 45:        READ%=1
 46:        FILE.NUM%=1
 47:        FILE$="SALESPER.PAR"
 48:        GOSUB 1000
 49:        IF OLD.FILE%=0 THEN ERSW1%=1:GOTO 460
 50:        F$="S"
 51:        GOSUB 1100
 52:        CLOSE 1
 53:        FILE$="PRODUCT.PAR"
 54:        GOSUB 1000
 55:        IF OLD.FILE%=0 THEN ERSW2%=1:GOTO 460
 56:        F$="P"
 57:        GOSUB 1100
 58:        CLOSE 1
 59:              E%=0
 60:              FILE$="MASTER.FIL"
 61:              FILE.NUM%=1
 62:              GOSUB 1000
 63:              READ%=0
 64:              IF OLD.FILE%=0 THEN ERSW4%=1:GOTO 460
 65:        IF LEFT$(Q$,1)="Y" THEN LPRINTER
 66:        IF T$="S" THEN\
 67:              PRINT TAB(5);"SALESPERSON SUMMARY":\
 68:              PRINT TAB(5);"----------- -------":\
 69:                    GOTO 402
 70:        PRINT TAB(5);"SALESPERSON DETAIL REPORT"
 71:        PRINT TAB(5);"----------- ------ ------"
 72: 402    PRINT
 73:        PRINT TAB(5);"From: ";S.DATE$;"  To: ";E.DATE$
 74:        PRINT
 75:        IF T$="S" THEN\
 76:        PRINT TAB(5);"Slnm";TAB(10);"Name";TAB(33);"Num";TAB(41);\
 77:              "W Price";TAB(54);"R Price";TAB(67);"R-W":GOTO 404
 78:        PRINT TAB(5);"Slnm";TAB(10);"Name";TAB(26);"Date";TAB(33);\
 79:              "Inum";TAB(38);"Item Name";TAB(49);"#";TAB(54);\
 80:              "W Price";TAB(63);"R Price";TAB(72);"R-W"
 81: 404    PRINT
 82:        HOLD.NUM$="Z":HOLD.DATE$="Z"
 83:        NOT.FIRST%=0
 84:        W.TOT=0:R.TOT=0:R.W.TOT=0
 85:        W.TOTAL=0:R.TOTAL=0:R.W.TOTAL=0
 86:        NUM.TOT=0:G.TOT=0
 87: 410    END.FILE%=0
 88:        GOSUB 1500
 89:        IF END.FILE% THEN 420
 90:        E%=E%+1
 91:        IF DATE$<S.DATE$ OR DATE$>E.DATE$ THEN 410
 92:        GOSUB 450
 93:        IF SLSNUM$<>HOLD.NUM$ THEN GOSUB 430:GOTO 415
 94:        IF T$="D" AND DATE$<>HOLD.DATE$ THEN GOSUB 440
 95:              GOSUB 445
 96: 415            GOTO 410
 97: 420    GOSUB 430
 98:        PRINT:PRINT
 99:        PRINT TAB(5);"Grand Totals";
100:        IF T$="S" THEN PRINT TAB(32);G.TOT;TAB(40);W.TOTAL;\
101:              TAB(53);R.TOTAL;TAB(66);R.W.TOTAL:GOTO 425
102:        PRINT TAB(48);G.TOT;TAB(53);W.TOTAL;\
103:              TAB(62);R.TOTAL;TAB(71);R.W.TOTAL
104: 425    IF LEFT$(Q$,1)="Y" THEN PRINT FORM.FEED$:CONSOLE
105:        CLOSE 1
106:        INPUT "Hit RETURN";LINE RT$:GOTO 460
107: 430    HOLD.NUM$=SLSNUM$
108:        IF NOT.FIRST% AND T$="D" THEN\
109:              PRINT TAB(5);"Salesperson Totals";\
110:              TAB(48);NUM.TOT;TAB(53);W.TOT;\
111:              TAB(62);R.TOT;TAB(71);R.W.TOT:PRINT:GOTO 435
112:        IF NOT.FIRST% THEN PRINT TAB(32);NUM.TOT;TAB(40);W.TOT;\
113:              TAB(53);R.TOT;TAB(66);R.W.TOT
114: 435    NOT.FIRST%=1
115:              W.TOTAL=W.TOTAL+W.TOT
116:              R.TOTAL=R.TOTAL+R.TOT
117:              R.W.TOTAL=R.W.TOTAL+R.W.TOT
118:              G.TOT=G.TOT+NUM.TOT
119:              W.TOT=0:R.TOT=0:R.W.TOT=0
120:              NUM.TOT=0
121:        IF END.FILE% THEN 434
122:        PRINT TAB(5);SLSNUM$;TAB(10);NAME$;
123:              IF T$="D" THEN GOSUB 440
124:              GOSUB 445
125: 434                                        RETURN
126: 440    HOLD.DATE$=DATE$
127:        PRINT TAB(26);DATE$;
128:                                           RETURN
129: 445    IF T$="S" THEN 447
```

```
130:     PRINT TAB(33);ITEM$;TAB(38);ITEMNAME$;TAB(48);NUM;TAB(53);\
131:         W.PRICE;TAB(62);R.PRICE;TAB(71);R.W
132:  447  W.TOT=W.TOT+W.PRICE
133:     R.TOT=R.TOT+R.PRICE
134:     R.W.TOT=R.W.TOT+R.W
135:     NUM.TOT=NUM.TOT+NUM
136:                                  RETURN
137:  450  FOR X%=1 TO NUM.SALES%
138:         IF SLSNUM$=SALESPER$(X%) THEN NAME$=SALESNAME$(X%):\
139:                 GOTO 455
140:     NEXT X%
141:                                  RETURN
142:  455  FOR X%=1 TO NUM.PROD%
143:         IF ITEM$=ITEMNUM$(X%) THEN ITEMNAME$=ITEMNAME$(X%):\
144:                 W.PRICE=VAL(W.PRICE$(X%)):\
145:                 R.PRICE=VAL(R.PRICE$(X%)):\
146:                 W.PRICE=W.PRICE*NUM:\
147:                 R.PRICE=R.PRICE*NUM:\
148:                 R.W=R.PRICE-W.PRICE:GOTO 457
149:     NEXT X%
150:  457                             RETURN
151:  460                             CHAIN "MANAGE"
152:  REM OPEN FILE
153:  1000 OLD.FILE%=0
154:     IF END # FILE.NUM% THEN 1010
155:     OPEN FILE$ AS FILE.NUM%
156:         OLD.FILE%=1
157:         GOTO 1020
158:  1010 IF READ% THEN 1020
159:     CREATE FILE$ AS FILE.NUM%
160:  1020
161:  REM GET FILE INTO ARRAYS
162:  1100 END.FILE%=0
163:     IF F$="S" THEN N%=NUM.SALES% ELSE N%=NUM.PROD%
164:                 FOR A%=1 TO N%
165:                     GOSUB 1200
166:                     IF END.FILE% THEN 1110
167:                     IF F$="S" THEN SALESPER$(A%)=LEFT$(REC$,3):\
168:                                    SALESNAME$(A%)=MID$(REC$,4,15)
169:                     IF F$="P" THEN ITEMNUM$(A%)=LEFT$(REC$,4):\
170:                                    ITEMNAME$(A%)=MID$(REC$,5,10):\
171:                                    W.PRICE$(A%)=MID$(REC$,15,6):\
172:                                    R.PRICE$(A%)=RIGHT$(REC$,6)
173:                 NEXT A%
174:  1110                            RETURN
175:  REM READ SALES OR ITEM FILE
176:  1200 IF END # FILE.NUM% THEN 1210
177:         READ # FILE.NUM%;REC$
178:                                  RETURN
179:  1210 END.FILE%=1
180:                                  RETURN
181:  REM READ MASTER FILE
182:  1500 IF END # FILE.NUM% THEN 1510
183:     READ # FILE.NUM%;KEY$
184:     SLSNUM$=LEFT$(KEY$,3)
185:     DATE$=MID$(KEY$,4,6)
186:     ITEM$=MID$(KEY$,10,4)
187:     NUM$=RIGHT$(KEY$,3)
188:     NUM=VAL(NUM$)
189:                                  RETURN
190:  1510 END.FILE%=1
191:                                  RETURN
192:  END
NO ERRORS DETECTED
CONSTANT AREA:      8
CODE SIZE:       2035
DATA STMT AREA:     0
VARIABLE AREA:    496
```

Use All Your Terminal's Capabilities

Continued from page 88

Program 1

```
10 REM           PROGRAM.#1
20 REM           Demonstrate arrow keys
30 WAIT 0,1,1
40 A=INP(1): REM  GET CHARACTER FROM PORT 1
50 IF A>127 THEN A=A-128: REM  REMOVE ANY CHARACTERS ABOVE 127
60 PRINT CHR$(A);
70 GOTO 30
```

Table 1

```
10 REM                      TABLE # 1
20 REM
30 REM  ----------  CURSOR  CONTROL  COMMANDS  -----------
40 REM
50 Q1$=CHR$(27)+"+":  REM  CLEAR SCREEN
60 Q2$=CHR$(27)+"&":  REM  SET PROTECT MODE
70 Q3$=CHR$(27)+"'":  REM  RESET PROTECT
80 Q4$=CHR$(27)+")":  REM  START WRITE PROTECT
90 Q5$=CHR$(27)+"(":  REM  END WRITE PROTECT
100 Q6$=CHR$(27)+"=":  REM  LOAD CURSOR
110 Q7$=CHR$(27)+"*":  REM  CLEAR DISPLAY TO NULLS
120 Q8$=CHR$(27)+"T":  REM  ERASE LINE
130 U1$=CHR$(11)    :  REM  UP CURSOR
140 P$=Q2$+Q4$      :  REM  PROTECT
150 PP$=Q3$+Q5$     :  REM  UNPROTECT
160 REM
170 REM  ------------------------------------------------
```

Example 1

```
10 REM   EXAMPLE 1 - PERSONAL DATA COLLECTING PROGRAM
20 CLEAR 1000
30 WIDTH 80
40 REM  ------------  CURSOR  CONTROLS  ---------------
50 REM
60 Q1$=CHR$(27)+"+":  REM  CLEAR SCREEN
70 Q2$=CHR$(27)+"&":  REM  SET PROTECT MODE
80 Q3$=CHR$(27)+"'":  REM  RESET PROTECT
90 Q4$=CHR$(27)+")":  REM  START WRITE PROTECT
100 Q5$=CHR$(27)+"(":  REM  END WRITE PROTECT
110 Q6$=CHR$(27)+"=":  REM  LOAD CURSOR
120 Q7$=CHR$(27)+"*":  REM  CLEAR DISPLAY TO NULLS
130 Q8$=CHR$(27)+"T":  REM  ERASE LINE
140 U1$=CHR$(11)    :  REM  UP CURSOR
150 P$=Q2$+Q4$      :  REM  PROTECT
160 PP$=Q3$+Q5$     :  REM  UNPROTECT
```

```
760 T$=LEFT$(T$,3)+"-"+RIGHT$(T$,4):GOTO 780
770 T$="("+X$+") "+XX$+"-"+RIGHT$(Y$,4)
780 PRINT Q4$ "Tel: " Q5$ T$ TAB(25) Q4$ "B.D.: " Q5$ B$;
790 PRINT TAB(45) Q4$ "Age: " Q5$ A1$
800 PRINT Q4$ STRING$(50,45) Q5$
810 X=22:Y=5:GOSUB 200:INPUT "Are there any corrections";YN$
820 IF YN$="Y" THEN PRINT Q2$:GOTO 340
```

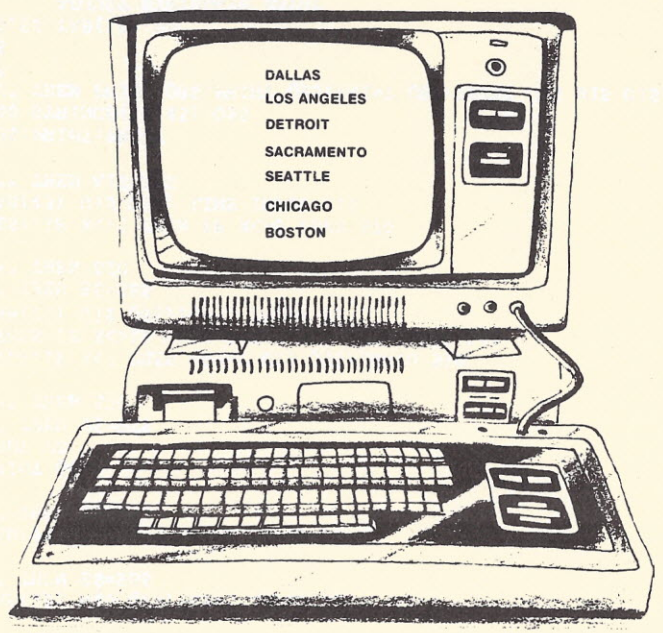
Example 2

```
10 REM  EXAMPLE 2  -  [  CHECK.BAS  ]
20 CLEAR 1000
30 WIDTH 120
40 REM  ----------  CURSOR  CONTROL  COMMANDS  -----------
50 REM
60 Q1$=CHR$(27)+"+":  REM  CLEAR SCREEN
70 Q2$=CHR$(27)+"&":  REM  SET PROTECT MODE
80 Q3$=CHR$(27)+"'":  REM  RESET PROTECT
90 Q4$=CHR$(27)+")":  REM  START WRITE PROTECT
100 Q5$=CHR$(27)+"(":  REM  END WRITE PROTECT
110 Q6$=CHR$(27)+"=":  REM  LOAD CURSOR
120 Q7$=CHR$(27)+"*":  REM  CLEAR DISPLAY TO NULLS
130 Q8$=CHR$(27)+"T":  REM  ERASE LINE
140 U1$=CHR$(11)    :  REM  UP CURSOR
150 P$=Q2$+Q4$      :  REM  PROTECT
160 PP$=Q3$+Q5$     :  REM  UNPROTECT
170 REM
180 REM  ------------------------------------------------
190 GOTO 390
200 PRINT CHR$(27) CHR$(61) CHR$(31+X) CHR$(31+Y);:RETURN
210 REM ---------  DATA PROMPT SUBROUTINE  ----------
220 X=6:Y=50:GOSUB 200:PRINT "  TRANSACT. TYPE"
230 X=7:GOSUB 200:PRINT "  --------------"
240 X=9:GOSUB 200:PRINT "1 - Reimbursement"
250 X=10:GOSUB 200:PRINT "2 - Medical expense"
260 X=11:GOSUB 200:PRINT "3 - Food and Entertainment"
270 X=12:GOSUB 200:PRINT "4 - Lodging"
280 X=13:GOSUB 200:PRINT "5 - Office Equipment"
290 X=14:GOSUB 200:PRINT "6 - Office Supplies"
300 X=15:GOSUB 200:PRINT "7 - Miscellaneous"
310 X=16:GOSUB 200:PRINT "8 - Taxes"
320 RETURN
330 REM  ------------  SLIDING CURSOR SUBROUTINE  ------------
340 F=LEN(F$)
350 FOR V4=1 TO F+1:PRINT ".";:NEXT V4
360 FOR V4=F+1 TO 1 STEP-1:PRINT "." CHR$(8) CHR$(8);:NEXT V4
370 RETURN
380 REM  ------------------------------------------------
390 PRINT Q7$
400 REM  ---------  SET WRITE PROTECT FIELD  -----------
410 PRINT Q2$
420 PRINT:PRINT
430 PRINT TAB(28) "CHECKBOOK RECORD"
440 PRINT TAB(28) "----------------"
450 PRINT:PRINT Q4$ "Date of Transaction:  " Q5$ "....."
```

```
170 REM
180 REM  ------------------------------------------------
190 GOTO 210
200 PRINT CHR$(27) CHR$(61) CHR$(31+X) CHR$(31+Y);:RETURN
210 PRINT Q7$
220 REM  ---------  SET WRITE PROTECT FIELD  -----------
230 PRINT P$
240 PRINT "1. NAME  ";Q5$:PRINT
250 PRINT Q4$ "2. ADDRESS  ";Q5$
260 PRINT:PRINT Q4$ "3. CITY  ";Q5$
270 PRINT TAB(18) U1$ Q4$ "4. STATE  ";Q5$
280 PRINT TAB(40) U1$ Q4$ "5. ZIP  " Q5$
290 PRINT:PRINT Q4$ "6. TELEPHONE  ";Q5$
300 PRINT TAB(13) U1$ Q4$ "7. BIRTH  ";Q5$
310 PRINT TAB(35) U1$ Q4$ "8. AGE  " Q5$
320 PRINT:PRINT
330 REM  ------------------------------------------------
340 PRINT CHR$(30)
350 PRINT Q8$;:LINE INPUT N$
360 PRINT:IF N$="" THEN N$=NN$
370 NN$=N$
380 PRINT Q8$;:LINE INPUT A$:PRINT
390 IF A$="" THEN A$=AA$
400 AA$=A$
410 PRINT Q8$;:LINE INPUT C$
420 IF C$="" THEN C$=CC$
430 CC$=C$
440 PRINT TAB(28) U1$ Q8$;:LINE INPUT S$
450 IF S$="" THEN S$=SS$
460 SS$=S$
470 PRINT TAB(48) U1$ Q8$;:LINE INPUT Z$
480 IF Z$="" THEN Z$=ZZ$
490 ZZ$=Z$
500 PRINT:PRINT Q8$;
510 LINE INPUT T$
520 IF T$="" THEN T$=TT$
530 IF T$="*" THEN 570
540 TT$=T$
550 X=LEN(TT$):IF X<7 THEN PRINT U1$ Q8$;:GOTO 510
560 IF X>7 THEN IF X<>10 THEN PRINT U1$ Q8$;:GOTO 510
570 PRINT TAB(23) U1$ Q8$;:LINE INPUT B$
580 IF B$="" THEN B$=BB$
590 IF B$="*" THEN 620
600 BB$=B$
610 X=LEN(BB$):IF X<>5 THEN IF X<>6 THEN 570
620 PRINT TAB(43) U1$ Q8$;:LINE INPUT A1$
630 IF A1$="" THEN A1$=A2$
640 A2$=A1$
650 PRINT Q3$:PRINT:PRINT
660 PRINT Q4$ STRING$(50,45) Q5$
670 IF Y$="Y" THEN PRINT Q8$:PRINT Q8$:PRINT Q8$:PRINT U1$ U1$ U1$;
680 PRINT N$
690 PRINT A$
700 PRINT C$,S$ TAB(19) Z$
710 REM          ADJUST BIRTHDATE ENTRY
720 X=LEN(B$):IF X=5 THEN B$="0"+B$
730 B$=LEFT$(B$,2)+"-"+MID$(B$,3,2)+"-"+RIGHT$(B$,2)
740 REM          ADJUST TELEPHONE DISPLAY OUTPUT
750 X=LEN(T$):IF X=10 THEN X$=LEFT$(T$,3):Y$=RIGHT$(T$,7):XX$=LEFT$(Y$,3):
        GOTO 770
460 PRINT:PRINT Q4$ "CHECK # " Q5$ "...."
470 PRINT:PRINT Q4$ "AMOUNT OF CHECK:" Q5$ "........"
480 PRINT:PRINT Q4$ "PAYEE:  " Q5$ ".................."
490 PRINT:PRINT Q4$ "TYPE OF TRANSACTION:  " Q5$ ".."
500 REM          INPUT  DATA
510 X=7:Y=1:GOSUB 200
520 F$="......":IF YN$="Y" THEN GOSUB 340
530 PRINT F$ CHR$(13);
540 LINE INPUT DATE$
550 IF DATE$="" THEN DATE$=D1$
560 IF DATE$="*" THEN 600:  REM   ALLOWS  BYPASSING ENTRY OF DATE
570 D1$=DATE$
580 L=LEN(DATE$):IF L<5 THEN 510
590 IF L>6 THEN 510
600 PRINT
610 F$="....":IF YN$="Y" THEN GOSUB 340
620 PRINT F$ CHR$(13);
630 LINE INPUT CK$
640 IF CK$="" THEN CK$=C1K$
650 C1K$=CK$
660 PRINT
670 F$=".....":IF YN$="Y" THEN F$=F$+STRING$(14,32):GOSUB 340
680 PRINT Q8$ F$ CHR$(13);
690 LINE INPUT AMT$
700 IF AMT$="" THEN AMT$=A1$
710 A1$=AMT$
720 PRINT
730 F$=STRING$(16,46)
740 IF YN$="Y" THEN F$=F$+STRING$(13,32):GOSUB 340
750 PRINT Q8$ F$ CHR$(13);
760 LINE INPUT PAYEE$
770 IF PAYEE$="" THEN PAYEE$=P1$
780 P1$=PAYEE$
790 PRINT
800 F$="..":IF YN$="Y" THEN F$=F$+STRING$(20,46):GOSUB 340
810 PRINT Q8$ CHR$(13) ".." CHR$(13);
820 GOSUB 220:X=15:Y=5:GOSUB 200:YN$="Y"
830 LINE INPUT TA$
840 IF TA$="" THEN TA$=T1$
850 IF VAL(TA$)=1 THEN TB$="Reimbursement"
860 IF VAL(TA$)=2 THEN TB$="Medical Expense"
870 IF VAL(TA$)=3 THEN TB$="Food and Entertainment"
880 IF VAL(TA$)=4 THEN TB$="Lodging"
890 IF VAL(TA$)=5 THEN TB$="Office Equipment"
900 IF VAL(TA$)=6 THEN TB$="Office Supplies"
910 IF VAL(TA$)=7 THEN TB$="Miscellaneous"
920 IF VAL(TA$)=8 THEN TB$="Taxes"
930 T1$=TA$
940 Y=50:FOR X=6 TO 16:GOSUB 200:PRINT Q8$:NEXT X
950 GOTO 980
960 X=22:Y=5:YN$="#":GOSUB 200:PRINT "Any Corrections ";:INPUT YN$
970 IF YN$="Y" THEN 510
980 X=7:Y=1:GOSUB 200
990 D2$=DATE$:X=LEN(D2$):IF X=5 THEN D2$="0"+D2$
1000 D2$=LEFT$(D2$,2)+"-"+MID$(D2$,3,2)+"-"+RIGHT$(D2$,2)
1010 PRINT Q8$ D2$:PRINT
1020 PRINT Q8$ CK$:PRINT
1030 PRINT Q8$ "*****";:PRINT USING "$$###,###.##";VAL(AMT$);:PRINT "   *****"
1040 PRINT:PRINT Q8$ PAYEE$:PRINT
1050 PRINT Q8$ TB$
1060 GOTO 960
```

Travel Planner

Continued from page 104



Program listing

```
10 CLEAR 5000
20 CLS:PRINT:PRINT
30 INPUT "ENTER LAST NAME OF TRAVELER";LN$
40 INPUT "ENTER FIRST INITIAL";FI$
50 N$=LN$+FI$
60 N$=RIGHT$(N$,8)
70 DIM CITY$(50,6),CR$(15),NU$(15),VISIT(30)

80 PC=64:'              CHANGE TO FIT THE NUMBER OF COLUMNS
90 L$=STRING$(PC,"-"):' ON YOUR PARTICULAR PRINTER
100 S$=STRING$(50,32)
110 GOSUB 870:'         LOAD CITY DATA FILE FROM DISK
120 GOSUB 1780:'        LOAD CAR RENTAL DATA FILE

130 '****** MENU ******

140 CLS:PRINT:PRINT
150 PRINT "                ****** MENU ******"
160 PRINT
170 PRINT"        1.) ENTER NEW CITIES"
180 PRINT"        2.) SET UP A TRIP"
```

```
740 INPUT "ENTER FIRST NAME ON LIST ";NME$
750 IF INSTR(NME$,"$")>0 GOTO 820
760 INPUT "ENTER PHONE NUMBER ";PH$
770 IF INSTR(PH$,"$")>0 GOTO 820
780 CITY$(NC,5)=CITY$(NC,5)+NME$+"  "+PH$+CHR$(13)+CHR$(26)+CHR$(29)
790 CLS:PRINT:PRINT
800 INPUT "ENTER NEXT NAME ON LIST  ($ TO FINISH) ";NME$
810 GOTO 750
820 RETURN

830 ' ***** MISC COMMENTS ON CITY ******

840 LINEINPUT "ENTER ENTERTAINMENT/MISC./COMMENTS  ";CITY$(NC,6)
850 RETURN

860 ' ****** LOAD CITIES FROM DISK ******

870 OPEN "I",1,N$
880 INPUT #1,NC
890 '  FOR N=1 TO NC
900 '    FOR COL=1 TO 6
910 '      INPUT #1, CITY$(N,COL)
920 '    NEXT COL
930 '  NEXT N
940 CLOSE 1
950 RETURN

960 '****** SET UP A TRIP

970 CLS:PRINT:PRINT
980 V=1
990 GOSUB 250
1000 PRINT
1010 PRINT "ENTER NUMBERS OF CITIES IN THE ORDER IN WHICH THEY WILL"
1020 PRINT "BE VISITED;  ENTER '$ ' WHEN FINISHED."
1030 PRINT
1040 PRINT @ 840," ENTER CITY NUMBER ";
1050 LINEINPUT A$
1060 IF VAL(A$)>NC GOTO 1040
1070 IF A$="$" GOTO 1180
1080 PRINT @ 840,S$;
1090 PRINT @ 904," ENTER DATE (MM/DD) :";
1100 LINEINPUT DA$(V)
1110 PRINT @ 904,S$;
1120 A=VAL(A$)
1130 IF A<1 GOTO 1040

1140 IF A>NC GOTO 1040
1150 VISIT(V)=A
1160 V=V+1
1170 GOTO 1040
1180 CLS:PRINT:PRINT
1190 PRINT "TURN ON PRINTER NOW. HIT ANY KEY WHEN READY"
1200 IF INKEY$="" GOTO 1200
1210 LPRINT:LPRINT
1220 LPRINT LN$;"  ";FI$
1230 LPRINT
1240 LPRINT L$
1250 '  FOR N2=1 TO V
1260 '    LPRINT
1270 '    LPRINT DA$(N2)
1280 '    LPRINT
1290 '    FOR N3=1 TO 6
1300 '      LPRINT CITY$(VISIT(N2),N3)
1310 '    NEXT N3
1320 '  NEXT N2
1330 GOTO 140
```

```
190 PRINT"        3.) UPDATE A CITY"
200 PRINT"        4.) ENTER NEW RENTAL CAR COMPANIES"
210 PRINT
220 INPUT" ENTER CHOICE: ";CH$
230 ON VAL(CH$) GOTO 340,970,1350,1580

240 '****** PRINT CURRENT CITY FILE TO SCREEN ******

250 PRINT " CITIES CURRENTLY IN THE FILE :"
260 PRINT
270 :  FOR N=1 TO NC STEP 2
280 :    PRINT N;".) ";CITY$(N,1),
290 :    IF CITY$(N+1,1)<>"" PRINT N+1;".) ";CITY$(N+1,1)
300 :    IF N/12=INT(N/12) GOSUB 1980
310 :  NEXT N
320 RETURN

330 ' ****** ADD CITIES TO CURRENT FILE ******

340 CLS:PRINT
350 GOSUB 250
360 PRINT
370 NC=NC+1
380 GOSUB 460:'  ----------------------------
390 GOSUB 580:'    THESE ARE TREATED AS
400 GOSUB 690:'    SUBROUTINES SO THAT
410 GOSUB 730:'    EACH MAY BE ACCESSED
420 GOSUB 840:'    SEPARATELY DURING UPDATE
430 GOSUB 1880:'  ----------------------------
440 GOTO 140

450 '****** ENTER NAME OF CITY, AND HOTEL INFORMATION ******

460 INPUT"ENTER NAME OF NEW CITY :";CITY$(NC,1)
470 INPUT"ENTER NAME OF FAVORITE HOTEL :";HT$
480 INPUT"ENTER RESERVATION PHONE NUMBER :";PH$
490 CITY$(NC,2)=HT$+"  PHONE : "+PH$
500 INPUT "DO YOU HAVE A PREFERRED ALTERNATE HOTEL";AN$
510 IF LEFT$(AN$,1)<>"Y" RETURN
520 INPUT"ENTER ALTERNATE HOTEL :";HT$
530 HT$=HT$+STRING$(3,32)
540 INPUT"ENTER RESERVATION PHONE NUMBER :";PH$
550 CITY$(NC,2)=CITY$(NC,2)+CHR$(13)+CHR$(26)+CHR$(29)+"ALTERNATE HOTEL :"+CHR$(26)+CHR$(29)+HT$
+PH$
560 RETURN

570 ' ****** ENTER CAR RENTAL INFORMATION ******

580 CLS:PRINT
590 :  FOR N=1 TO NR
600 :    PRINT N;".) ";CAR$(N)
610 :  NEXT N
620 INPUT"ENTER PREFERRED CAR RENTAL COMPANY :";CR$
630 CC=VAL(CR$):IF CC<1 OR  CC>NR GOTO 620
640 CITY$(NC,3)=CAR$(CC)+"  PHONE FOR RESERVATIONS:  "+NU$(CC)+CHR$(26)+CHR$(29)
650 INPUT "ENTER NUMBER FOR PICKUP AT AIRPORT :";PH$
660 CITY$(NC,3)=CITY$(NC,3)+"FOR AIRPORT PICKUP PHONE :"+PH$
670 RETURN

680 ' ****** ENTER AIRLINES DATA ******

690 PRINT "ENTER MAJOR OR PREFERRED AIRLINES SERVING ";CITY$(NC,1);"  :";:LINEINPUT CITY$(NC,4)
700 CITY$(NC,4)="AIRLINE(S) : "+CITY$(NC,4)
710 RETURN

720 '****** ENTER NAMES OF CLIENTS IN CITY ******

730 PRINT "ENTER NAMES OF MAJOR CLIENT CONTACTS IN CITY,
          ENTER '$' WHEN FINISHED :"

1340 ' ****** UPDATE A CITY ******

1350 CLS:PRINT:PRINT
1360 GOSUB 250
1370 PRINT:PRINT
1380 INPUT "ENTER NUMBER OF CITY TO BE UPDATED :";UP$
1390 UP=VAL(UP$)
1400 IF UP<1 OR UP>NC GOTO 1350
1410 :  FOR N=2 TO 6
1420 :    CLS:PRINT:PRINT
1430 :    PRINT CITY$(UP,N)
1440 :    PRINT
1450 :    INPUT "DO YOU WISH TO CHANGE THIS INFORMATION";AN$
1460 :    IF LEFT$(AN$,1)="Y" GOSUB 1510
1470 :  NEXT N
1480 IF FLAG=1 THEN NC=T
1490 GOSUB 1880
1500 GOTO 140
1510 T=NC
1520 NC=UP
1530 FLAG=1
1540 CITY$(UP,N)=""
1550 ON N-1 GOSUB 470,580,690,730,840
1560 RETURN

1570 '****** ENTER NEW RENTAL CAR COMPANIES ******

1580 CLS:PRINT:PRINT
1590 NR=NR+1
1600 INPUT "ENTER NAME OF NEW CAR RENTAL COMPANY";CAR$(NR)
1610 INPUT "ENTER RESERVATION NUMBER :";NU$(NR)
1620 INPUT "DO YOU WISH TO ENTER ANOTHER COMPANY";AN$
1630 IF LEFT$(AN$,1)="N" GOTO 1650
1640 GOTO 1590
1650 OPEN "O",1,"CARS"
1660 PRINT #1,NR
1670 :  FOR N=1 TO NR
1680 :    PRINT #1,CAR$(N);",";
1690 :  NEXT N
1700 CLOSE
1710 OPEN "O",2,"NUMBERS"
1720 :  FOR N=1 TO NR
1730 :    PRINT #2,NU$(N);",";
1740 :  NEXT N
1750 CLOSE
1760 GOTO 140

1770 ' ******* INPUT CAR RENTAL AGENCIES FROM DISK ******

1780 OPEN "I",1,"CARS"
1790 OPEN "I",2,"NUMBERS"
1800 INPUT #1,NR
1810 :  FOR N=1 TO NR
1820 :    INPUT #1,CAR$(N)
1830 :    INPUT #2,NUMBER$(N)
1840 :  NEXT N
1850 CLOSE
1860 RETURN

1870 ' ****** SAVE CITIES TO DISK ******

1880 OPEN "O",1,N$
1890 PRINT #1,NC
1900 :  FOR N=1 TO NC
1910 :    FOR COL=1 TO 6
1920 :      PRINT #1,CHR$(34);CITY$(N,COL);CHR$(34);",";
1930 :    NEXT COL
1940 :  NEXT N
```

```
1950 CLOSE
1960 RETURN

1970 ' ****** PAGE ******

1980 PRINT:PRINT
1990 PRINT " HIT ANY KEY TO SEE REST OF LIST"
2000 IF INKEY$="" GOTO 2000
2010 CLS:PRINT:PRINT
2020 RETURN
2030 '****** INITIALIZE FILE ******

    NOTE:  RUN THIS MODULE WHEN PROGRAM IS
           FIRST USED, OR TO CREATE BLANK
           FILE FOR NEW USER.

2040 PRINT "HAS THIS PROGRAM BEEN RUN BEFORE";AN$
2050 INPUT "ENTER LAST NAME OF NEW USER :";LN$
2060 INPUT "ENTER FIRST INITIAL OF NEW USER :";FI$
2070 N$=LN$+FI$
2080 N$=RIGHT$(N$,8)
2090 GOSUB 1880
3000 IF LEFT$(AN$,1)="N" GOTO 1650
3010 GOTO 140
```

Sample run

```
RUN

ENTER LAST NAME OF TRAVELER ? BUSCH
ENTER FIRST INITIAL? D

      ****** MENU ******
    1.) ENTER NEW CITIES
    2.) SET UP A TRIP
    3.) UPDATE A CITY
    4.) ENTER NEW RENTAL CAR COMPANIES

   ENTER CHOICE: ?  1

CITIES CURRENTLY IN FILE :

1.) CHICAGO          2.) DETROIT
3.) CLEVELAND        4.) ST. LOUIS
5.) NEW YORK         6.) CINCINNATI
7.) PITTSBURGH       8.) BOSTON
9.) NEWARK          10.) MILWAUKEE

ENTER NAME OF NEW CITY : ? AKRON
ENTER NAME OF FAVORITE HOTEL : ? HOLIDAY INN CASCADE
ENTER RESERVATION PHONE NUMBER : ? 800-238-1111
DO YOU HAVE A PREFERRED ALTERNATE HOTEL? YES
ENTER ALTERNATE HOTEL: ? HOLIDAY INN KENT
ENTER RESERVATION PHONE NUMBER : ? 800-238-1111

1.) HERTZ
2.) AVIS
3.) NATIONAL
4.) THRIFTY
5.) BUDGET

ENTER PREFERRED CAR RENTAL COMPANY :? 4
ENTER NUMBER FOR PICKUP AT AIRPORT :? 297-5191
ENTER MAJOR OR PREFERRED AIRLINES SERVING AKRON: ? UNITED
ENTER NAMES OF MAJOR CLIENT CONTACTS IN CITY:
     ENTER ' # ' WHEN FINISHED :
ENTER FIRST NAME ON LIST : ?GEORGE SMITH -- KELSEY COMPANY
ENTER PHONE NUMBER : ?  444-1111
ENTER NEXT NAME ON LIST ( # TO FINISH ) : ? #

ENTER ENTERTAINMENT/MISC./COMMENTS: NONE

  ****** MENU ******
 1.) ENTER NEW CITIES
 2.) SET UP A TRIP
 3.) UPDATE A CITY
 4.) ENTER NEW CAR RENTAL COMPANIES

ENTER CHOICE : ? 2

SAMPLE RUN PAGE 2

CITIES CURRENTLY IN THE FILE :

1.) CHICAGO          2.) DETROIT
3.) CLEVELAND        4.) ST. LOUIS
5.) NEW YORK         6.) CINCINNATI
7.) PITTSBURGH       8.) BOSTON
9.) NEWARK          10.) MILWAUKEE
11.) AKRON

ENTER NUMBERS OF CITIES IN THE ORDER IN WHICH THEY
WILL BE VISITED.  ENTER ' # ' WHEN FINISHED.

ENTER CITY NUMBER :  11
ENTER DATE (MM/DD):  06/03
ENTER CITY NUMBER :  3
ENTER DATE (MM/DD):  06/04
ENTER CITY NUMBER :  6
ENTER DATE (MM/DD):  06/05
ENTER CITY NUMBER :  #

TURN ON PRINTER NOW.  HIT ANY KEY WHEN READY.

BUSCH  D
------------------------------------------------------------
AKRON              06/03
HOLIDAY INN CASCADE  PHONE : 800-238-1111
ALTERNATE HOTEL : HOLIDAY INN KENT  PHONE : 800-238-1111
THRIFTY  PHONE FOR RESERVATIONS : 333-4589
FOR AIRPORT PICKUP PHONE : 297-5191
AIRLINE(S) : UNITED
GEORGE SMITH -- KELSEY COMPANY   444-1111
NONE

CLEVELAND          06/04
BOND COURT   PHONE : 800-666-6666
AVIS  PHONE FOR RESERVATIONS : 232-8000
FOR AIRPORT PICKUP PHONE : 455-5555
AIRLINE(S) : UNITED, NORTHWEST
JOHN JONES -- BIGELOW, INC.  456-3344
BILL WILLIAMS -- BW, CORP.  344-8888
JOE JOHNSON -- JOHNSON ADVERTISING  111-2222
NONE

CINCINNATI         06/05
KINGS ISLAND INN  PHONE 800-345-6789
NATIONAL  PHONE FOR RESERVATIONS : 567-8901
FOR AIRPORT PICKUP PHONE : AT AIRPORT
AIRLINE(S): UNITED
BILL BILSON 459-9000
COLLEGE FOOTBALL HALL OF FAME
```

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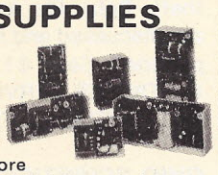
POWER SUPPLIES



If you can beat these prices we will be truly amazed. OEM's at 500 lot pay more than this. Call or write for full spec. sheets.

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+5V @ 2A	+12V @ 4A		US-323	56.25
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+5V @ 1A	–5V @ .5A	+24V @ 1.5A	US-205	52.50
+5V @ 2A	–5V @ .5A	+24V @ 3A	US-206	69.00
+5V @ 3A	–5V @ .6A	+24V @ 5A	US-162	89.00
+5V @ 1.7A	–5V @ 1.5A	+24V @ 2A	US-272	69.00
+5V @ 2A	+12V @ .4A	–12V @ .4A	US-HTAA	37.50

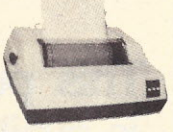
TELEVIDEO 912C

SOROC IQ120– $675.00
Televideo 912C– 665.00
ADDS R-25 – 710.00

Also have 920C, SOROC, HAZELTINE, etc. What we don't have is room on this page. Call Toll Free 800 number for prices.

C-ITOH PRINTER

$499.00

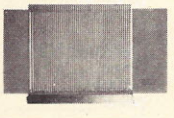


Look closely at the photo and see other adds in this rag at $995.00. Perfect units, warranteed. Only 500 pcs. Same story, manufacturerer had too many.

S-100 CARD EXTENDER

$12.50

(Gold Contacts)



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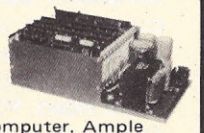
8"	SOFT 1D	3.25 ea.
8"	SOFT 2D	3.85 ea.
8"	SOFT 2DDS	5.00 ea.

SPECIAL OF THE QUARTER

S1-MOD (KIT)

$239.00 MADE IN USA



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EXPANDABLE RAM

★SPECIAL★SPECIAL★SPECIAL★

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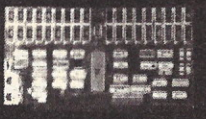
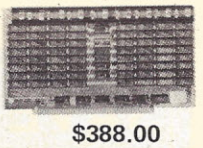


★ $389.00 A&T★

32K STATIC (KIT)

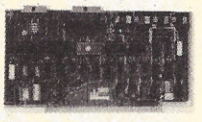
You have seen this well known board around for years. We bought 500 of them and plan on cornering the market! Bank Select on extended address lines.



$388.00

Z-80 CPU (KIT)

The first time this world popular CPU offered in Kit. 2 serial, 3 parallel, CTC, EProm Z-80 at 4 mhz. Software buad rate, etc.(less Prom)



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DUAL DRIVE SUBSYSTEM

$995.00

2 SHUGART 801R POWER SUPPLY

If this looks like a Lobo Drive System, don't be fooled. Just because it looks like one, works like one, smells like one, and tastes like one (?) doesn't mean it has to cost like one!

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4116s

200 NS

Expansion 16K Dynamic RAMs for Apple, TRS-80 S-100 systems. T.I., Mostek Intel, Call for manufacturer.

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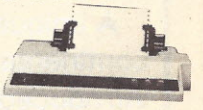
DIP-80 $399.00



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2114s

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TMS-4044
MM-5257
INTEL 2147

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250 NS

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2716s $13.50 (450 NS)
2708s $6.95 (450 NS)

Remember when 2716s were $50.00 and hard to get? These units are so beautiful it's hard to part with them. But we will, for a small price. Guaranteed!

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8" 801R
$395.00

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5¼" MINI

$265.00

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SHUGART / SIEMANS / MPI

CIRCLE INQUIRY NO. 123

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The June issue will take a comprehensive look at the various computer languages, examining the specialized uses and personal preferences that enter into language selection...

A unique program with a continental flair is introduced — a pseudo-compiler that converts Spanish/English Tiny Basic into standard Basic...

In an excerpt from his recently published book, Dr. Alan R. Miller explores the advantage of utilizing macro processors to supply more power for your Assembler.

A law firm in Alabama provides an in-depth case study of the advantages of utilizing computers in law offices...

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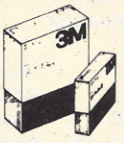

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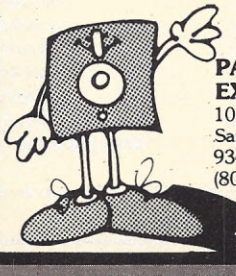

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*Manufacturer requests factory direct inquiry.

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